DRAFT

U.S. Food & Drug Administration
Muirkirk Road Campus
Draft Master Plan Report

June 04, 2021

PROJECT TEAM

Contract Holder

GSA

Client Agency

FDA U.S. FOOD & DRUG ADMINISTRATION

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Historic Preservation

QUINN EVANS

Cost Estimating

MGAC

NOMENCLATURE

The following terms and abbreviations may be used throughout this report:

General

- APE: Area of Potential Effect
- AR5: Fifth Assessment Report
- ARF: Animal Research Facility
- BMP: Best Management Practices
- BUG: Backlight, Uplight and Glare
- CMP: Corrugated Metal Pipe
- DIP: Ductile Iron Pipe
- ESD: Environmental Site Design
- ESDv: Environmental Site Design Volume
- EUI: Energy Use Intensity
- FIS: Flood Insurance Study
- HDPE: High-density Polyethylene
- IES: Illuminating Engineering Society
- IPaC: Information for Planning and Consultation
- IPCC: Intergovernmental Panel on Climate Change
- LEED®: Leadership in Energy and Environmental Design
- LID: Low Impact Development
- LOF: Letter of Findings
- LUFS: Land Use Feasibility Study
- MARC: Maryland Area Regional Commuter
- MDSPGP-5: Maryland State Programmatic General Permit 5
- MGS: Maryland Geographical Survey
- MOA: Memorandum of Agreement
- MOD: Module
- MRC: Muirkirk Road Campus
- MS4s: Municipal Separate Storm Sewer Systems
- MSAT: Mobile Source Air Toxic
- MSL: Mean Sea Level
- NCR: National Capital Region
- NOI: Notice of Intent
- NPDES: National Pollutant Discharge Elimination System
- NREL: National Renewable Energy Laboratory
- NRHP: National Register of Historic Places
- NSRDB: National Solar Radiation Database
- NZE: Net Zero Emissions
- PA: Programmatic Agreement
- PS: Parking Spaces
- POR: Program of Requirements
- RCP: Representative Concentration Pathways
- ROD: Record of Decision
- SDA: Spatial Daylight Autonomy
- SITES™: Sustainable Sites Initiative™
- SOV: Single-Occupancy Vehicle
- SPF: System Planning Forecast
- SVB: Stream Valley Buffer
- SWM: Stormwater Management
- TDM: Transportation Demand Management
- TIS: Traffic Impact Study
- TMDL: Total Maximum Daily Load
- TMP: Transportation Management Plan
- TMY: Typical Meteorological Year
- WUS: Waters of the United States

Laws & Regulations

- ABA: Architectural Barriers Act
- ABAAS: Architectural Barriers Act Accessibility Standards
- ADA: Americans with Disabilities Act
- CFR: Code of Federal Regulations
- COMAR: Code of Maryland Regulations
- CWA: Clean Water Act
- CZMA: Coastal Zone Management Act
- EIS: Environmental Impact Statement
- EISA: Energy Independence and Security Act of 2007
- MBTA: Migratory Bird Treaty Act
- NCA: Noise Control Act
- NEPA: National Environmental Policy Act
- NHPA: National Historic Preservation Act
- RCRA: Resource Conservation and Recovery Act

Governmental Agencies

- BARC: Beltsville Agricultural Research Center
- BRF: Beltsville Research Facility
- BIMC: Beltsville Information Management Center
- CFSAN: Center for Food Safety and Applied Nutrition
- CVM: Center for Veterinary Medicine
- DOEE: District Department of Energy & Environment
- DPIE: Department of Permitting, Inspections and Enforcement
- EPW: Environment and Public Works
- FEMA: Federal Emergency Management Agency
- FRC: Federal Research Center
- GSA: U.S. General Services Administration
- ISC: Interagency Security Committee

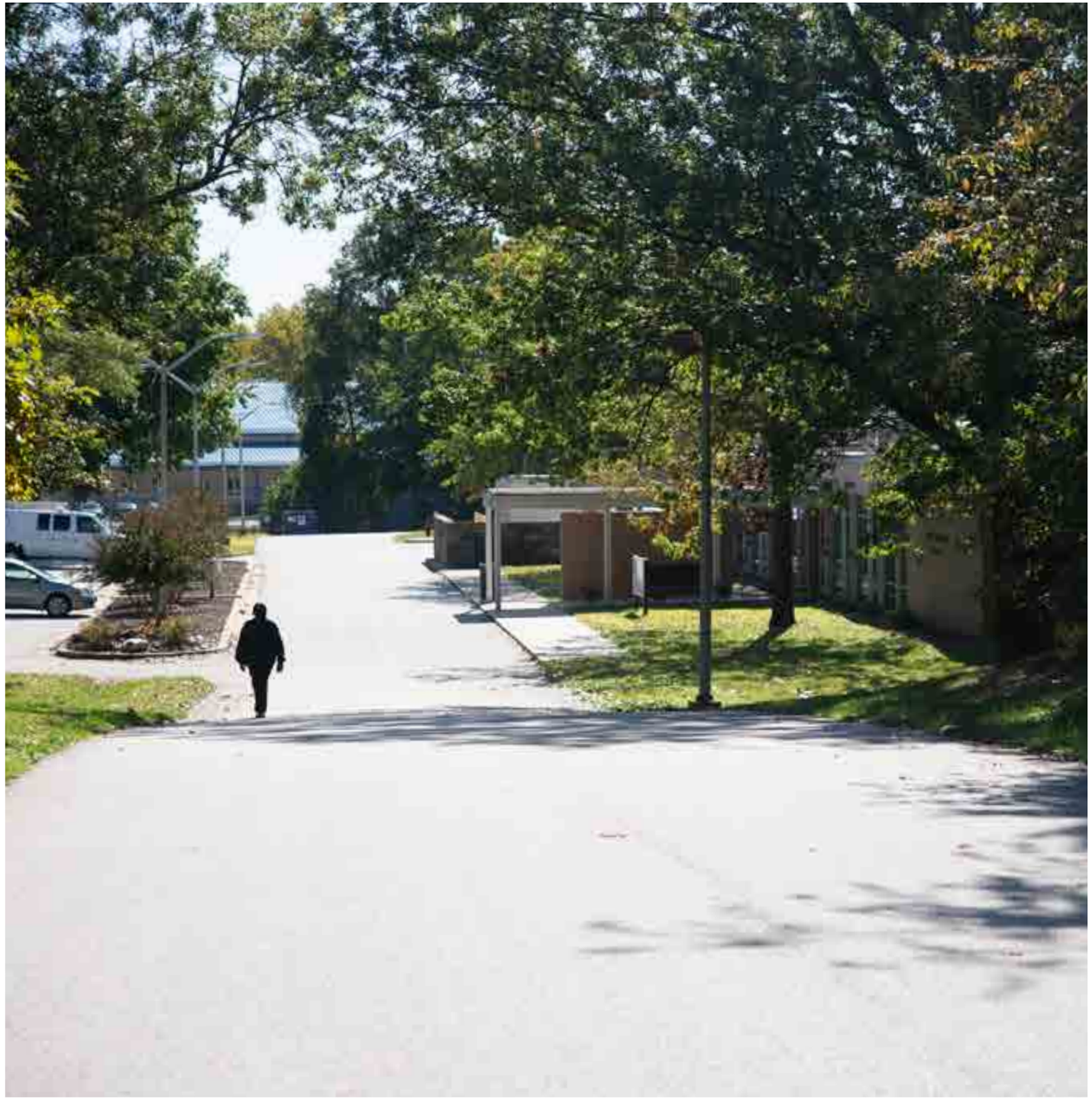
- MDE: Maryland Department of the Environment
- MDNR: Maryland Department of Natural Resources
- MDOT: Maryland Department of Transportation
- MDOT SHA: Maryland Department of Transportation State Highway Administration
- MHT: Maryland Historical Trust
- M-NCPPC: Maryland National Capital Park and Planning Commission
- MWCOG: Metropolitan Washington Council of Governments
- NCPC: National Capital Planning Commission
- OSHA: Occupational Safety and Health Administration
- PEPCO: Potomac Electric Power Company
- RTA: Regional Transportation Agency of Central Maryland
- USACE: U.S. Army Corps of Engineers
- USDA: U.S. Department of Agriculture
- USEPA: U.S. Environmental Protection Agency
- USFDA: U.S. Food and Drug Administration
- USFWS: U.S. Fish and Wildlife Service
- USGS: U.S. Geological Survey
- USHHS: U.S. Department of Health and Human Services
- WMATA: Washington Metropolitan Area Transportation Authority
- WSSC: Washington Suburban Sanitary Commission

Units of Measurements

- ac: acre
- BTU/hr: British Thermal Unit per Hour
- BTU: British Thermal Unit
- dB(A): A-weighted Decibel
- dbh: (tree) Diameter at Breast Height
- F: Fahrenheit
- FAR: Floor Area Ratio
- gsf: Gross Square Footage
- KBtu: Kilo British Thermal Unit
- $KgCO_2e$: Kilograms of Carbon dioxide equivalent emitted per
- kWh: Kilowatt-hour
- lf: Linear Feet
- m^2: Square Meter
- MMT: Million Metric Tons
- sf: Square Feet
- W/m^2: Watt per square meter

Definitions

- Housing: In the context of FDA, housing refers to provision of employee work location
- therm: (symbol, thm) is a non-SI unit of heat energy equal to 100000 British thermal units (Btu)



Entrance road looking southeast towards BRF (with Maryland Army National Guard in the back)

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FDA

U.S. FOOD & DRUG ADMINISTRATION

MISSION STATEMENT

The U.S. Food and Drug Administration (FDA) is responsible for protecting the public health by ensuring the safety, efficacy, and security of human and veterinary drugs, biological products, and medical devices; and by ensuring the safety of our nation's food supply, cosmetics, and products that emit radiation.

FDA also has responsibility for regulating the manufacturing, marketing, and distribution of tobacco products to protect the public health and to reduce tobacco use by minors.

FDA is responsible for advancing the public health by helping to speed innovations that make medical products more effective, safer, and more affordable and by helping the public get the accurate, science-based information they need to use medical products and foods to maintain and improve their health.

FDA also plays a significant role in the Nation's counterterrorism capability. FDA fulfills this responsibility by ensuring the security of the food supply and by fostering development of medical products to respond to deliberate and naturally emerging public health threats.

FDA Campuses and Facilities

To effectively support the FDA mission, FDA's campuses must be flexible and adaptable to the everchanging nature and complexity of the products that the FDA regulates. FDA's facilities must promote internal collaboration across multiple functional areas and facilitate advanced operational models that spur innovation by interdisciplinary teams. The location and configuration of FDA's facilities directly affect FDA's ability to collaborate across scientific disciplines and product centers and realize the innovation and efficiencies that collaboration spurs. These innovations and efficiencies are particularly important as the products that FDA regulates are becoming increasingly complex. Strategically locating and configuring facilities to improve opportunities for collaboration supports the function of integrated scientific teams, while, conversely, dispersing scientific expertise reinforces individual silos. Facilities that promote collaboration stimulate innovation and enhance FDA's ability to tackle critical public health challenges and foster increased medical product choice and competition for patients. Two examples of critical public health crises which FDA has a major role in are combating the current unpredictable coronavirus pandemic and its unknown long-term implications; and the national opioid epidemic.

0

AREA BOUNDARIES & PARCEL DELINEATION

0.AREA BOUNDARIES & PARCEL DELINEATION

0.1 Area Boundaries

FDA owns approximately 249 acres along Muirkirk Road in Laurel, MD. The land owned by FDA is bisected by Odell Road, dividing the property into a West and East Parcel. See Figure 0-1 for the location of FDA-owned land and Table 0-1 for a break-down by use and in acreage. See below for a more detailed description of the parcels.

West Parcel
The area west of Odell Road, or the West Parcel, is home to the Muirkirk Road Campus (MRC) and will be referred to as the MRC or the campus for the purposes of the Master Plan. The total land area of the MRC is approximately 197 acres. The southern portion of the campus is dedicated to animal research and home to the Animal Research Facility operated by the Center for Veterinary Medicine (CVM). This facility includes 15 pastures within four pasture areas, which taken together cover about 32 acres (see Figure 0-4). Moving forward, the four pasture areas will be referred to as Pastures A-D. The buildings in the southern portion are referred to as Buildings B-H (see Figure 0-4). The total land area of southern section is roughly 113 acres. The existing FDA offices and laboratories are concentrated on the northern portion of the campus, which in total covers approximately 52 acres. This portion of the campus is home to the Beltsville Research Facility (BRF) and two connected buildings, also called modules. The Master Plan refers to these buildings as MOD 1 and MOD 2. See Figure 0-2 for the area boundary of the MRC.

East Parcel
The area east of Odell Road is referred to as the East Parcel and is approximately 52 acres. The East Parcel has been divided into three smaller parcels. One parcel is occupied by the Maryland Army National Guard and another by the South Laurel Pumping Station. The third parcel consists of undeveloped land.

The Maryland Army National Guard occupies approximately 23 acres. About 10 acres of the 23 acres have been developed. The South Laurel Pumping Station occupies approximately 4 acres. The remaining area of approximately 25 acres has not been built. For the purposes of this Master Plan, the woodlands immediately east of Odell Road are referred to as the undeveloped area of the East Parcel. See Figure 0-3 for the area boundary of the East Parcel and the boundaries of the sub-parcels.

Area of Potential Development
As part of the master planning effort, a Land Use Feasibility Study (LUFS) was conducted for the FDA Muirkirk Road properties. The preliminary LUFS was conducted in 2018 and the study was updated in the fall of 2020. Further analysis resulted in the

Figure 0-1: Vicinity Map

FDA-Owned Land at Muirkirk Road	Acres (Approx.)	%
1. West Parcel		
• Area of Potential Development	52	21%
• Pastures A-D	32	13%
• Animal Research Facility (CVM)	113	45%
Subtotal West Parcel	**197**	**79%**
2. East Parcel		
• Maryland National Guard Facility	23	9%
• South Laurel Pumping Station	4	2%
• Undeveloped Area	25	10%
Subtotal East Parcel	**52**	**21%**
Total FDA-Owned Land at Muirkirk Road	**249**	**100%**

Source: Prince George's County Parcel Data

Table 0-1: FDA-owned Land at Muirkirk Road

determination of the area considered for potential development. The Area for Potential Development is approximately 52 acres. See Figure 0-3 for the area boundary of the Area for Potential Development.

Area of Environmental Assessment
To determine the proposed development's impacts to the human environment, an Environmental Impact Statement (EIS) was conducted in the spring of 2021. For the purposes of reviewing various environmental impacts, an area was determined. The study area is approximately 76 acres. See Figure 0-3 for the area boundary of the study area.

Area of Potential Effect (APE)
To determine the proposed development's impacts to cultural resources, an Area of Potential Effect (APE) was identified. The APE area is equal to the 249 acres of the East and West Parcel combined. See Figure 0-3 for the area boundary of the APE.

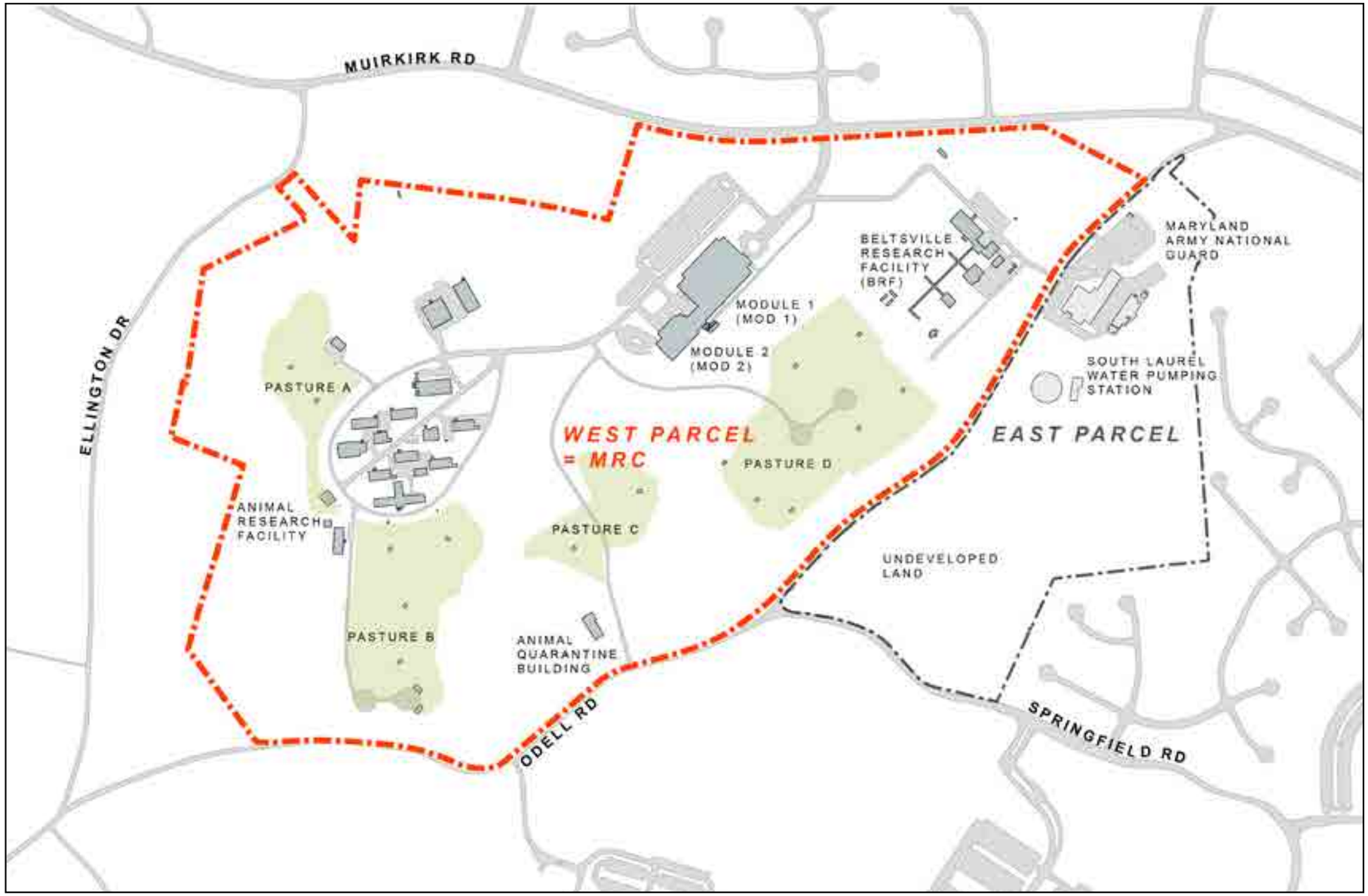


Figure 0-2: Area boundaries

0.2 Parcel Delineation

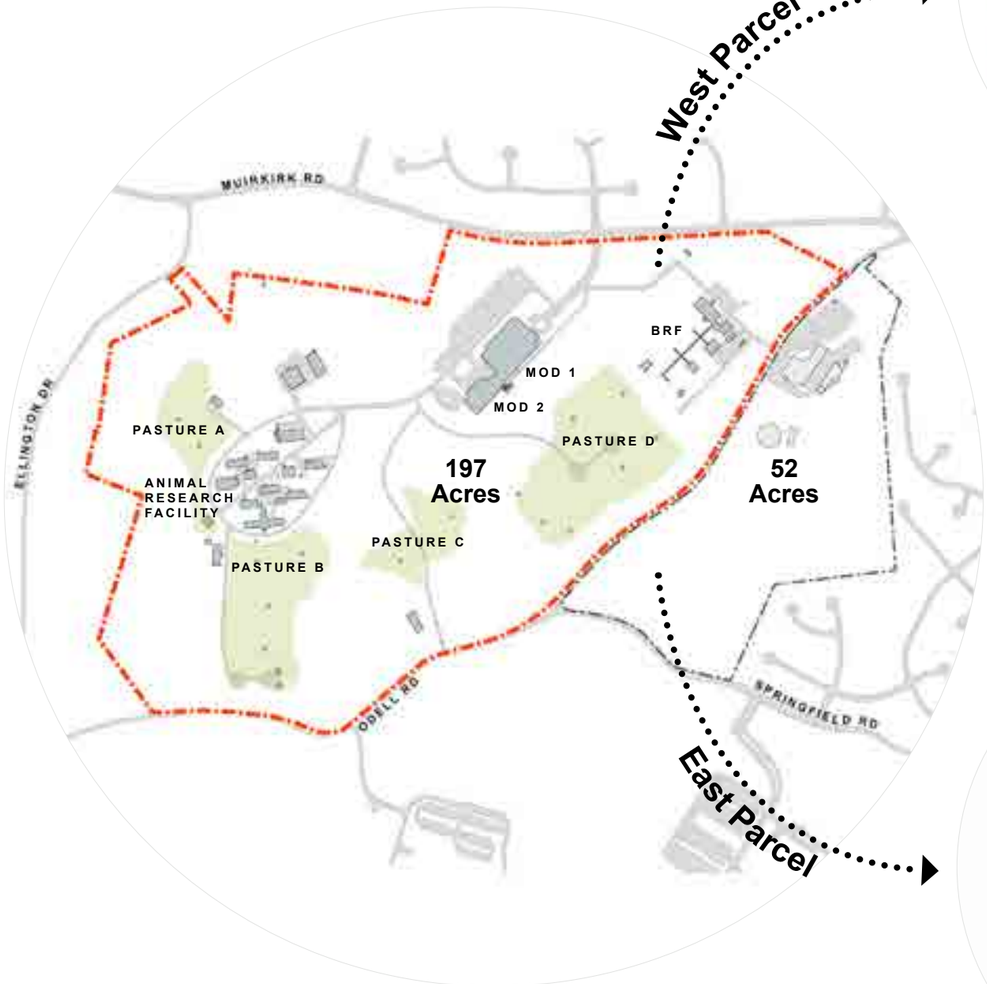
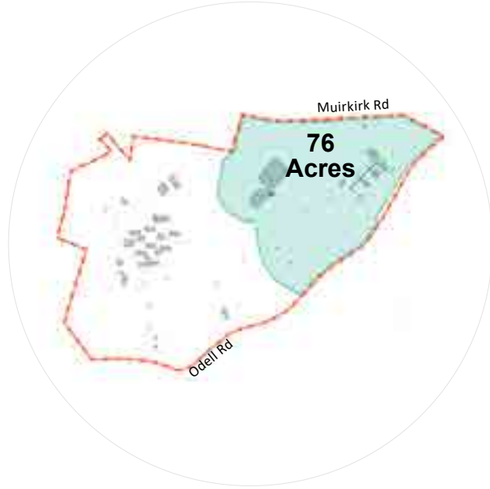


Figure 0-3: Parcel delineation

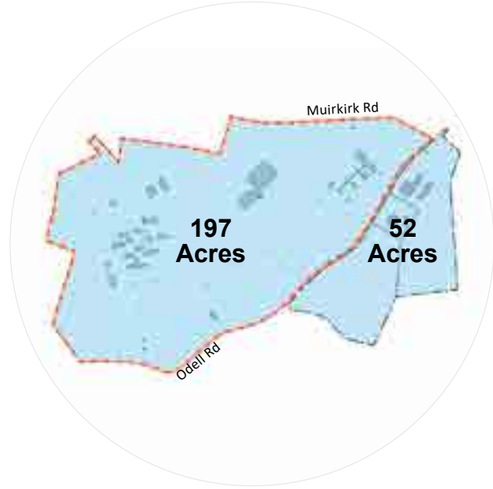
Area of Potential Development

Area where development is considered for the purposes of master planning



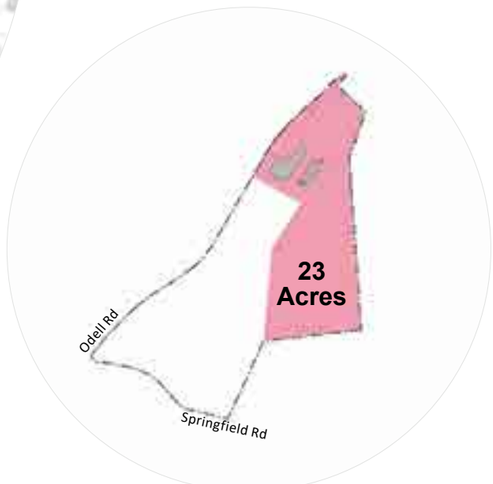
Area of Environmental Assessment

Area that has been studied for the purposes of reviewing environmental impacts



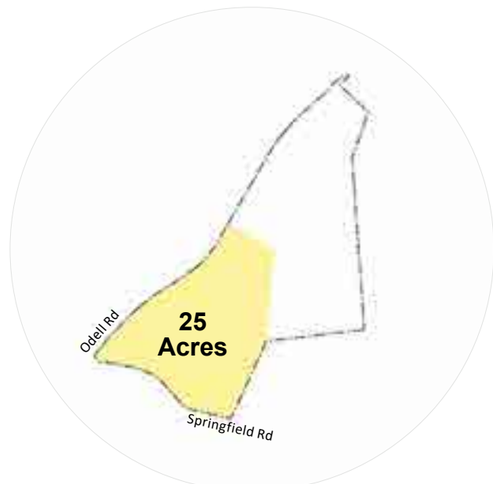
Area of Potential Effect

Area within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist



Maryland Army National Guard

South Laurel Pumping Station



Undeveloped Area

0.3 Pasture Areas

In total, there are 15 pastures referred to as “p 1”through “p 15” in Figure 0-4. As mentioned, the 15 pastures are located within four pasture areas, referred to as Pastures A-D.

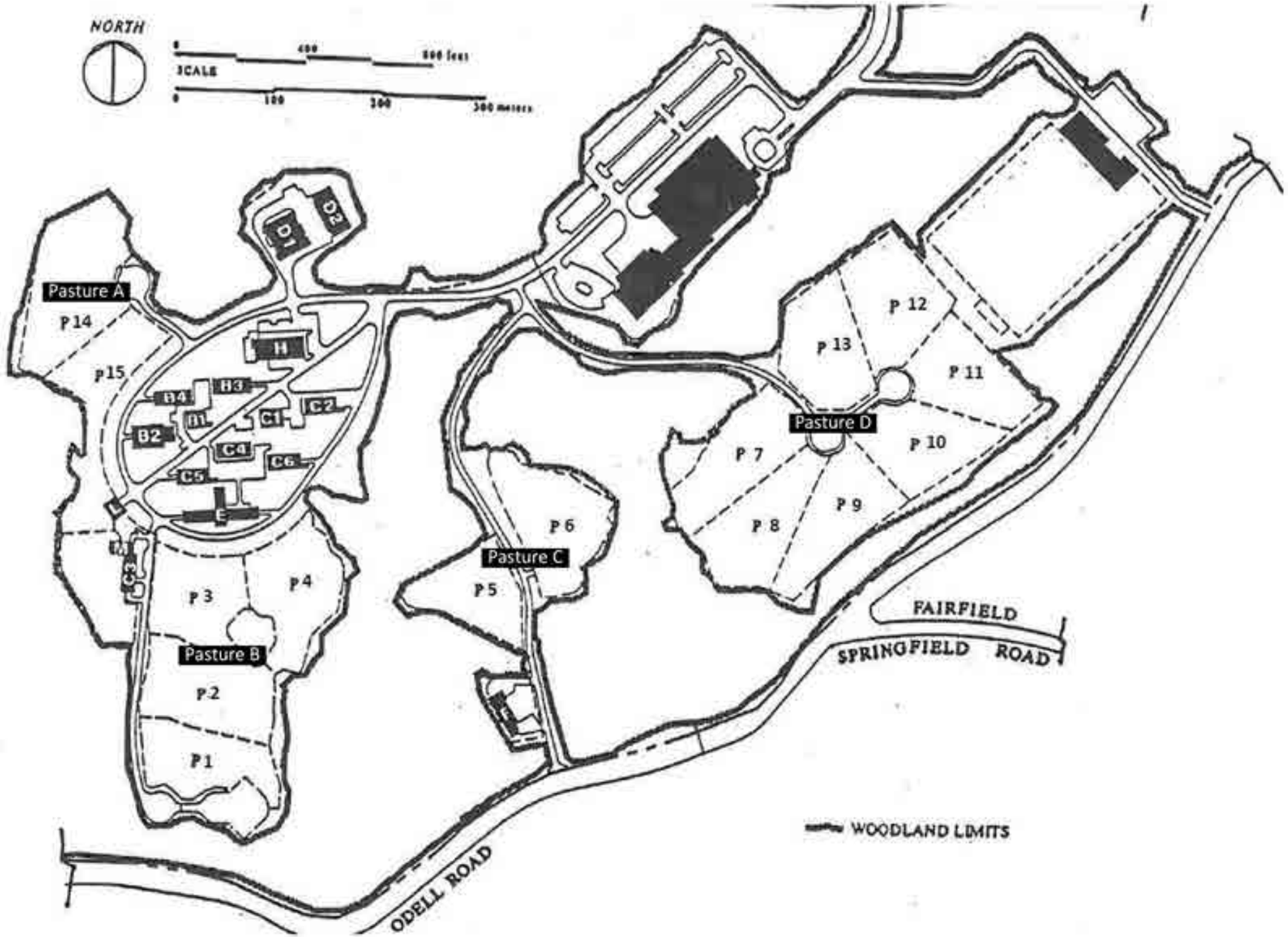


Figure 0-4: Pasture areas (Source: Undated image provided by FDA and edited by CRTKL for clarity)

1

OVERVIEW & EXISTING CONDITIONS

1. MASTER PLAN

This Draft Master Plan Report is the first step towards a Master Plan to guide future development at the Muirkirk Road Campus (MRC).

1.1 Executive Summary

The MRC is located within the larger DC metro area, about 16 miles north of Washington, DC and 24 miles south of Baltimore, MD (see Figure 1-1). The campus is 10.9 miles east of FDA's Headquarters at White Oak and 7.9 miles north of FDA's College Park campus. While technically part of the City of Laurel, the campus is in a semi-rural suburban area of Prince George's County (see Figure 1-2).

FDA owns 249 acres of land at Muirkirk Road, of which 197 acres make up the MRC. FDA acquired the land for the Beltsville Research Facility (BRF) from the U.S. Department of Agriculture (USDA) in 1964. Today, it is home to the CVM and the Center for Food Safety and Applied Nutrition (CFSAN) as well as support staff. The 1966 Site Development Plan and the 1981 Master Plan have been approved by National Capital Planning Commission (NCPC) and Prince George's County.

The MRC has a current population of 300 employees. The first phase of the proposed Master Plan assumes a near-term (5-6 year) consolidation of FDA staff with the addition of 700 employees resulting in a total population of 1,000 employees. The second phase assumes a 20-year horizon and an additional 800 employees which would bring the total population up to 1,800.

The 1966 Site Development Plan was approved by NCPC and Prince George's County for an 1,800-employee population and this was carried through in the 1981 Master Plan. This is stated in the 1995 EIS (pages 1-8). Unfortunately, no additional documentation is available for previous master planning efforts. However, FDA has reviewed its potential future needs and determined that the horizon year population of 1,800 employees is still appropriate for the MRC.

For the purposes of this Master Plan we assume:
- development of new office space: 175,000 gsf in Phase 1 and 200,000 gsf in Phase 2,
- development of new special use space: 63,000 gsf in Phase 1,
- provision of parking for employees and campus support staff at a ratio of 1 space for every 2 employees (1:2) for a total of 900 parking spaces, and
- provision of 80 parking spaces for visitors.

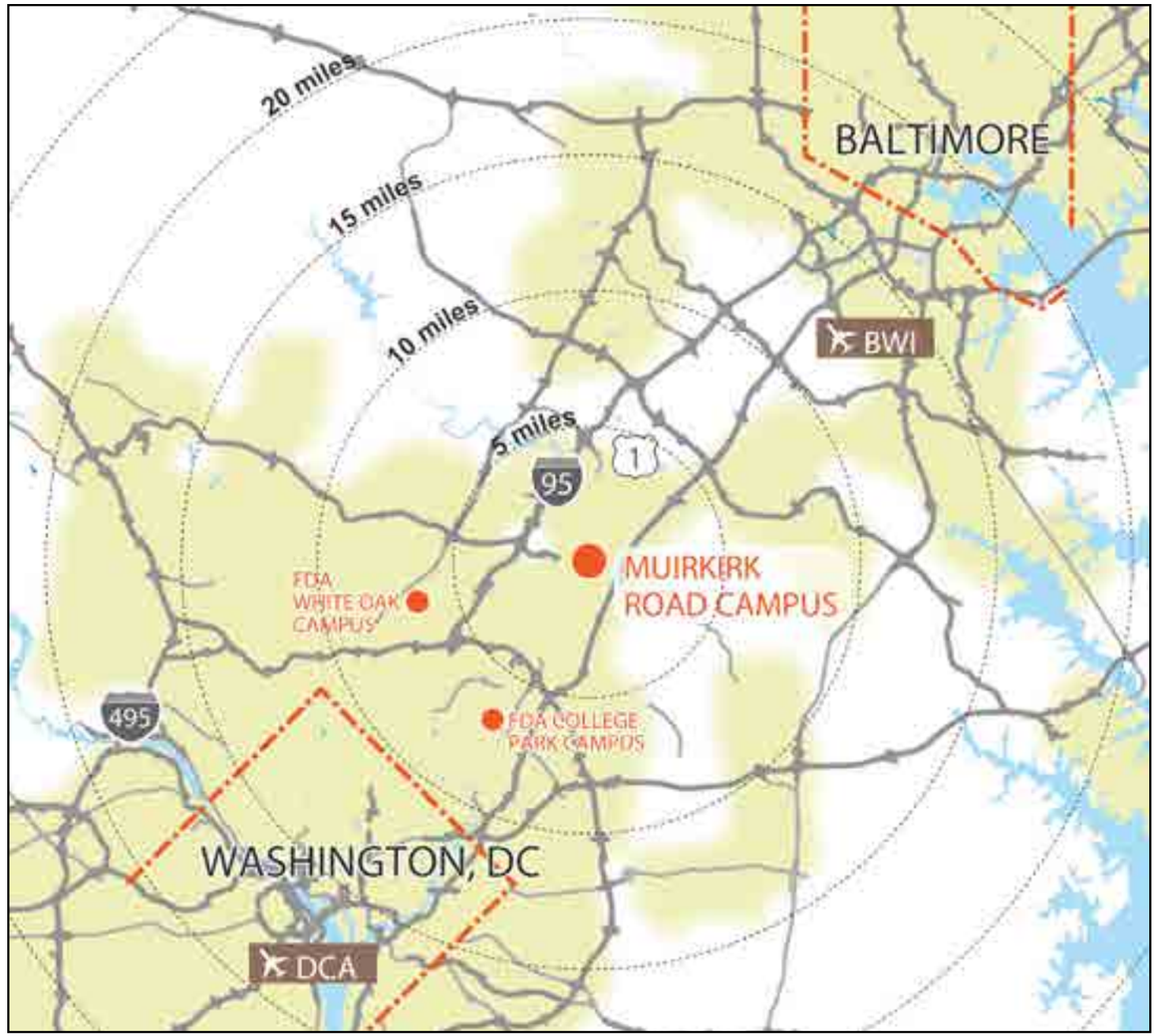


Figure 1-1: Regional context

Map not to scale

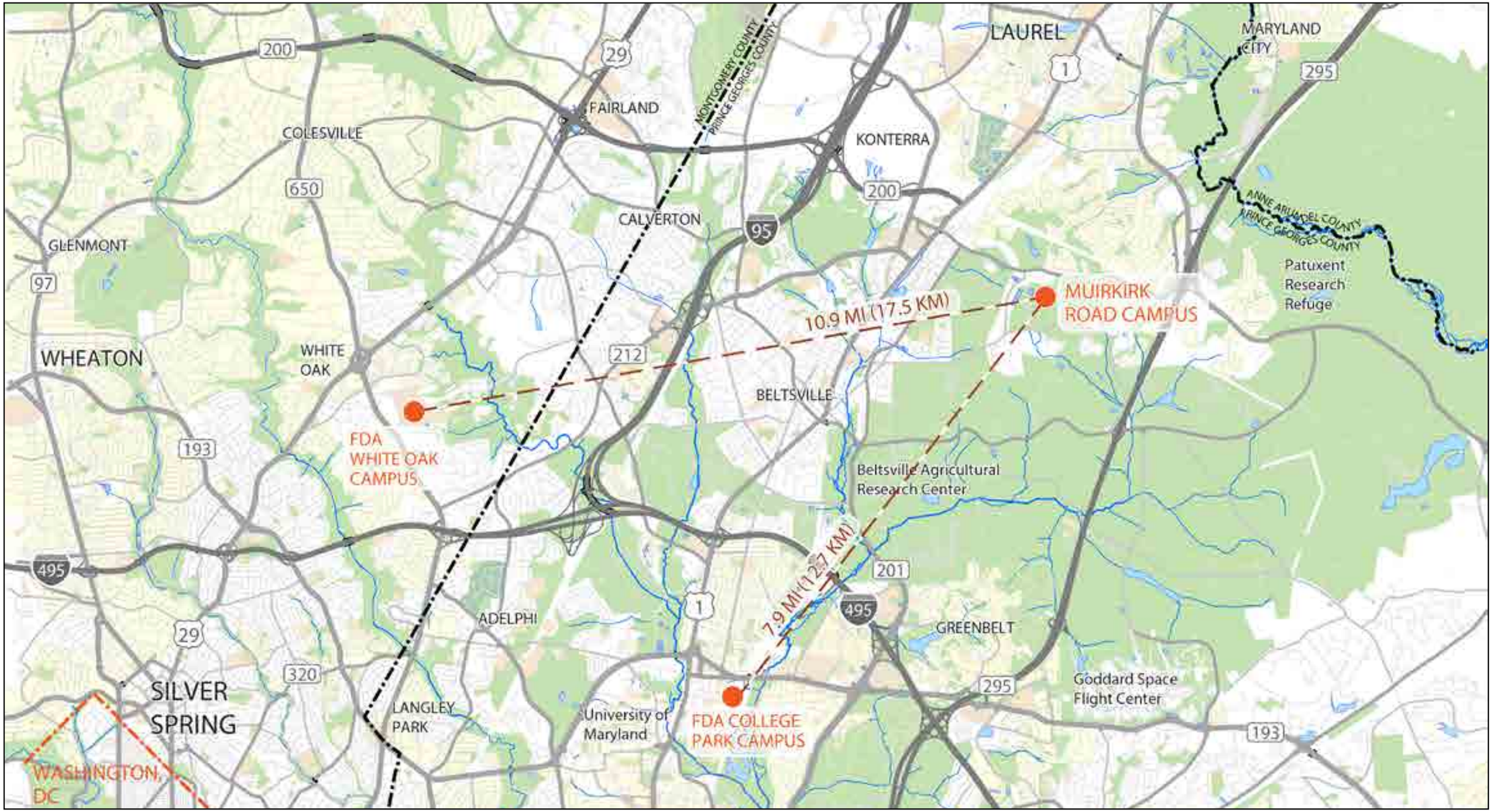


Figure 1-2: Site context

1.2 Project Introduction

The area surrounding the MRC is comprised of low-density residential areas to the north, west and east of the site, and U.S. government-owned properties on the south of the site, in particular the Beltsville Agricultural Research Center (BARC). The campus is approximately 16 miles north from central Washington, DC and 24 miles from downtown Baltimore, MD. The site is relatively well-connected to the regional freeway network, including I-295, I-95, MD 200, and US 1. The main access to the site is via Muirkirk Road, which is a two-lane roadway that connects US 1 and MD 200 to the west and to MD 197 and I-295 to the east. There are two secondary driveways onto the campus at Odell Road. The one across from the Maryland Army National Guard facility leads to the BRF. This entrance is currently closed. The second one is located just south of the intersection with Springfield Road and leads to a quarantine building, which is part of the Animal Research Facility. This entrance is for authorized vehicles only and this internal service road continues on to the research facilities on the campus.

The campus is served by one bus route operated by Regional Transportation Agency of Central Maryland (RTA), Route 302, which terminates at the MRC. The MRC entrance drive acts as a turn-around for the bus. The bus route connects to the Maryland Area Regional Commuter (MARC) rail service. On weekdays, the 302 bus route connects to the Muirkirk MARC Station to the west, to Laurel to the north and to the College Park Metro Station to the south. On weekends, the 302 bus route connects only to the Greenbelt Metro Station. The Muirkirk MARC Station is located approximately 1.5 miles from the site but is not easily accessed from the MRC due to limited transit, pedestrian, and bicycle connections on Muirkirk Road. This station is on the MARC Camden Line which connects Union Station in Washington, DC with Camden Station in Baltimore, MD. In addition to the MARC, the Greenbelt stations are serviced by the MetroRail Green and Yellow Lines. There is an Amtrak station at New Carrollton, about 11 miles south of the site.

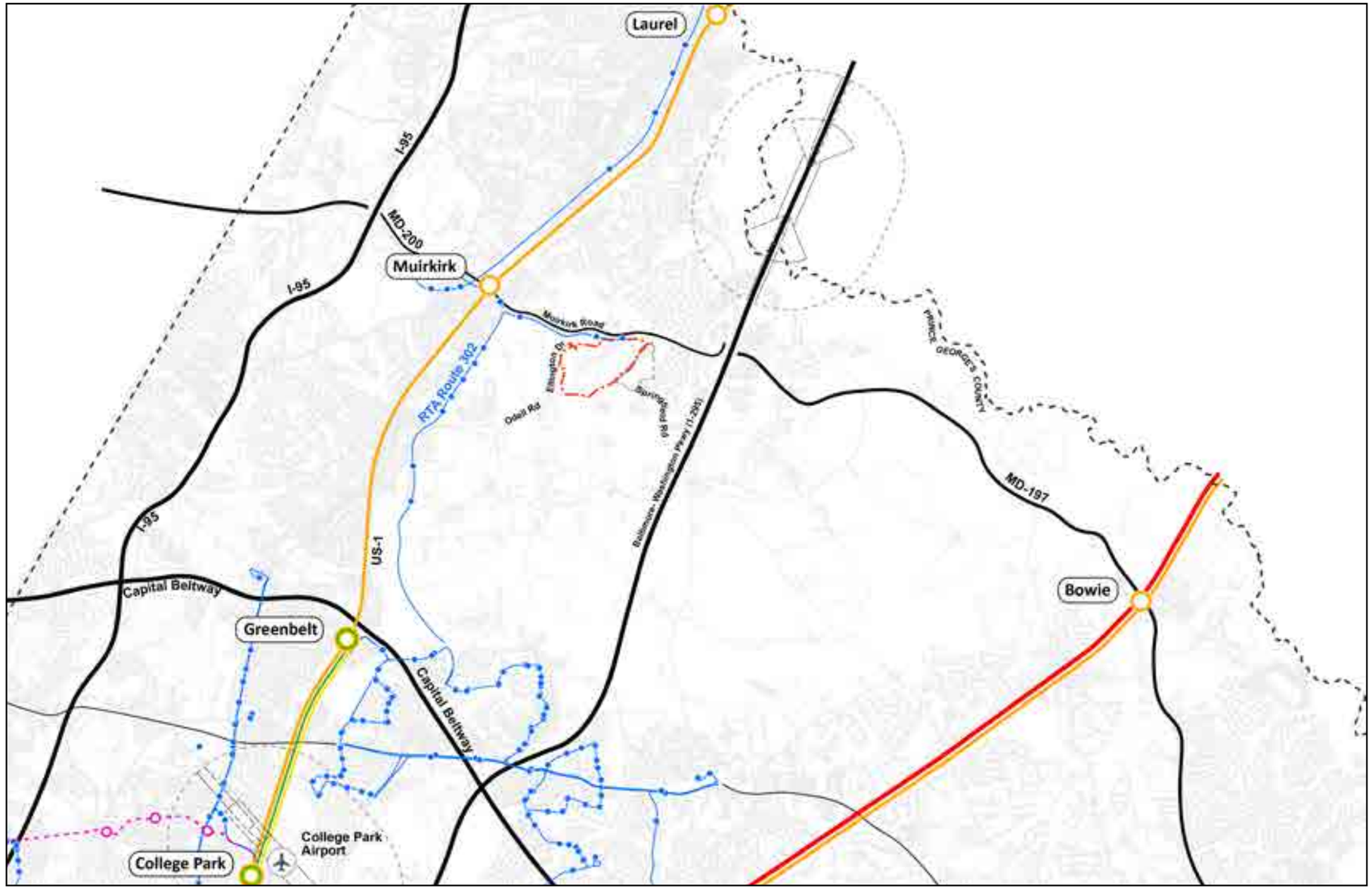


Figure 1-3: Regional transportation network

The campus is part of the green belt around Washington. Most of the surrounding area within a 1-mile radius is undeveloped park land and open space with some low-density residential development. Urban development within a 2-mile radius is concentrated west of the site.

Community Services (within 2-mile radius)

13 Religious Institutions

10 Playgrounds

8 Schools

10 Shopping Centers

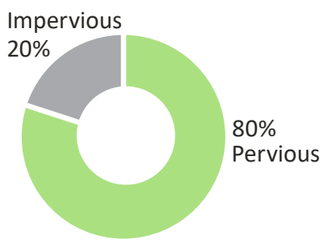
Nature (within 2-mile radius)

700 Acres of Parks

5000 Acres of Tree Coverage

200 Acres of Surface Water

Pervious vs Impervious (within 2-mile radius)



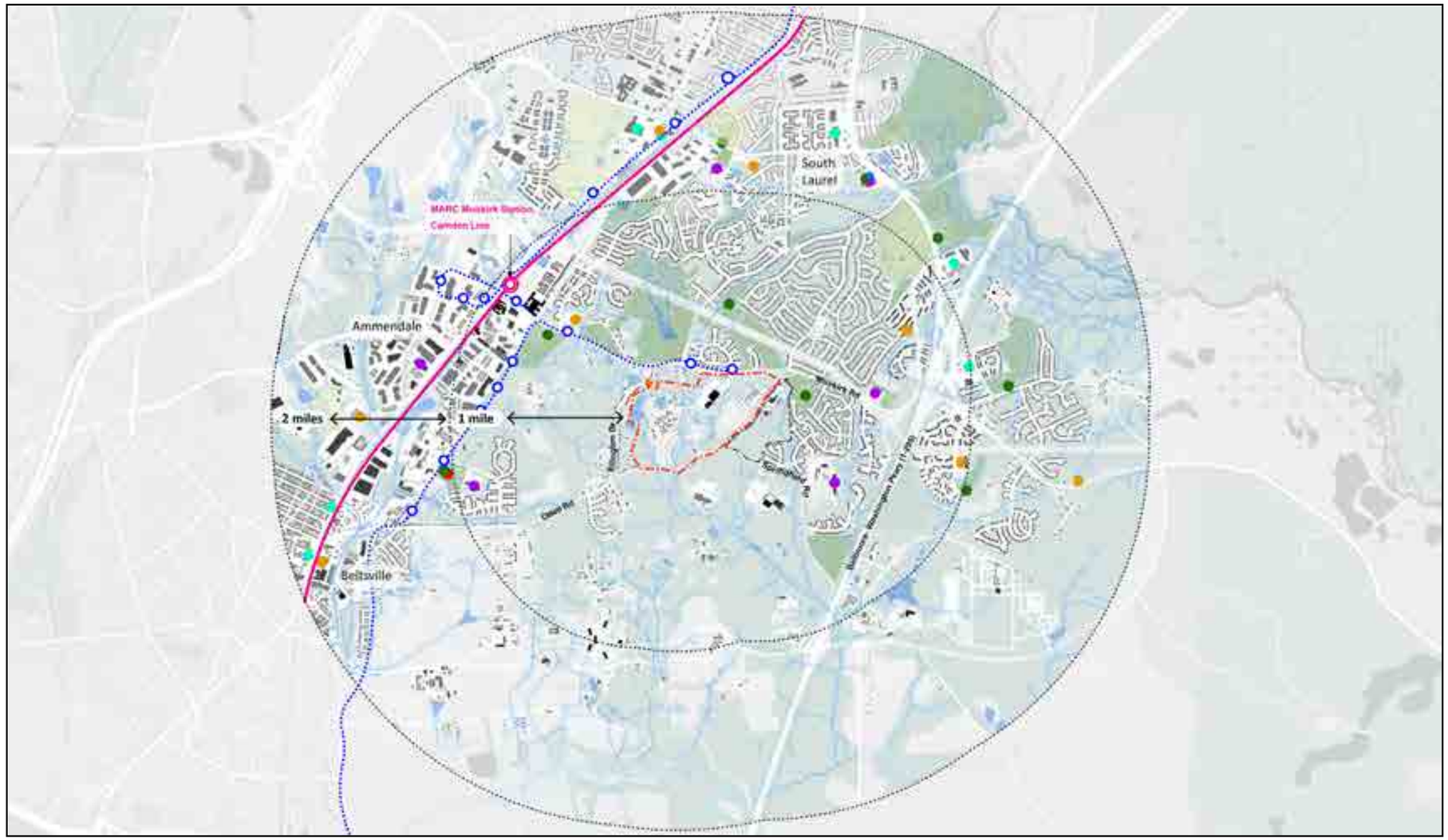


Figure 1-4: Site context

1.2.1 Campus History

1966 Site Development Plan

The original 1966 Site Development Plan established the key planning principles still relevant today.

The 1966 plan sought to:

- concentrate development on the northeast portion of the site,
- preserve the open spaces in the south and the west to serve as animal pastures,
- identify a building location for a laboratory facility, and
- provide access into the site from Muirkirk Road.

The 1966 Site Development Plan examined factors in the development of the plan, including land use, landscape, and topography. The first buildings, referred to as the BRF, were constructed in 1962-1963 in the northeastern portion of the site. These first buildings were built before the adoption of the Site Development Plan. The dog kennels that were part of the original complex have since been demolished and only the main building still exists today.

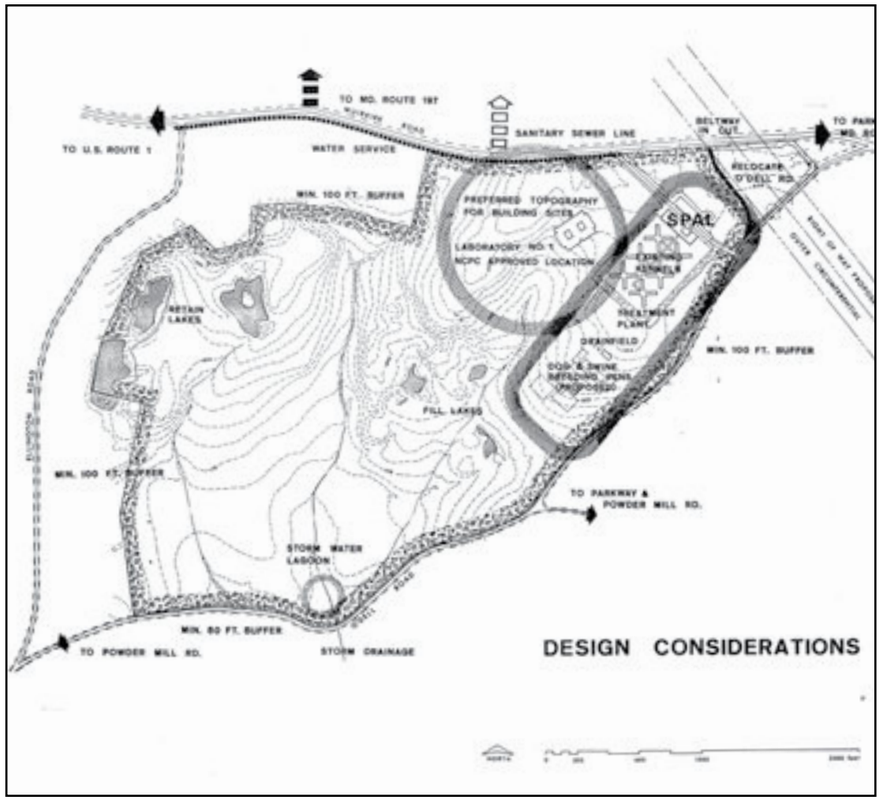


Figure 1-5: Design concept

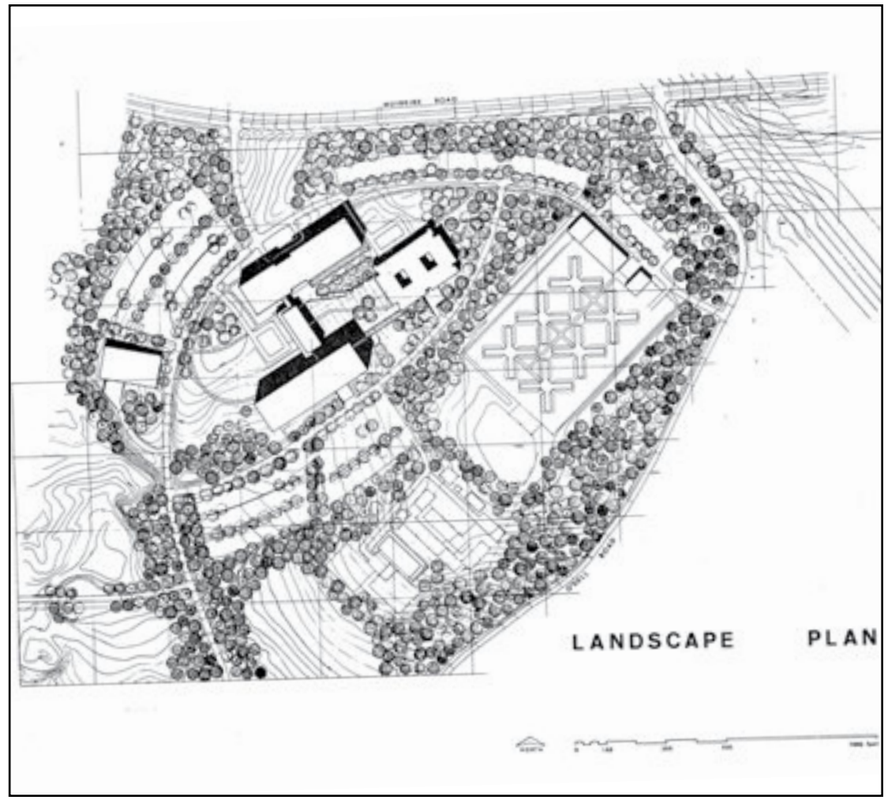


Figure 1-6: Landscape plan

Figure 1-7: Model and site planning

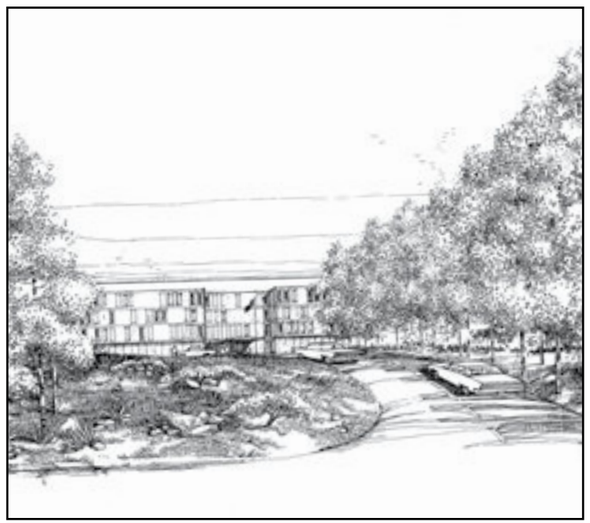


Figure 1-8: Landscape concept

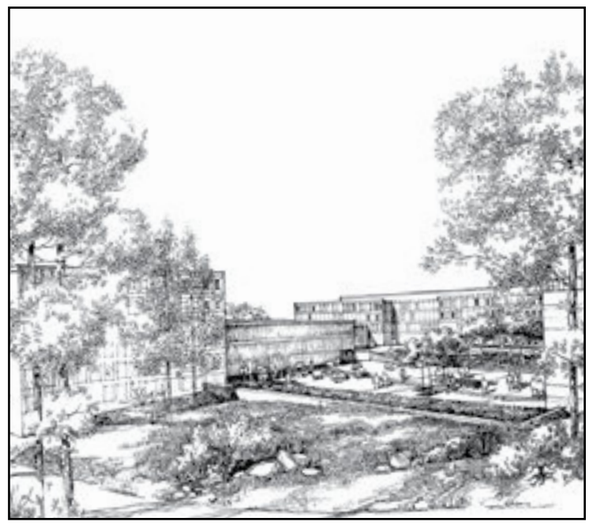


Figure 1-9: Landscape concept

1981 Master Plan
The 1981 Master Plan built upon the established planning principles of the 1966 Site Development Plan.

The 1981 plan sought to:
- limit future expansion to 1,800 employees,
- apply a parking ratio of 1: 1.5,
- ensure that buildings will not project above tree line,
- maintain a 100-foot buffer of vegetation along the perimeter, and
- maintain a 300-foot buffer along the western boundary abutting residential properties.

Based on a site assessment completed at the time, FDA concluded that the existing BRF was – for the most part – obsolete and renovation of the buildings was not an option. To meet future needs, the Master Plan proposed over 1 million gsf in five increments or modules. To date, only two modules, referred to as MOD 1 and MOD 2, have been built on the northern portion of the campus.

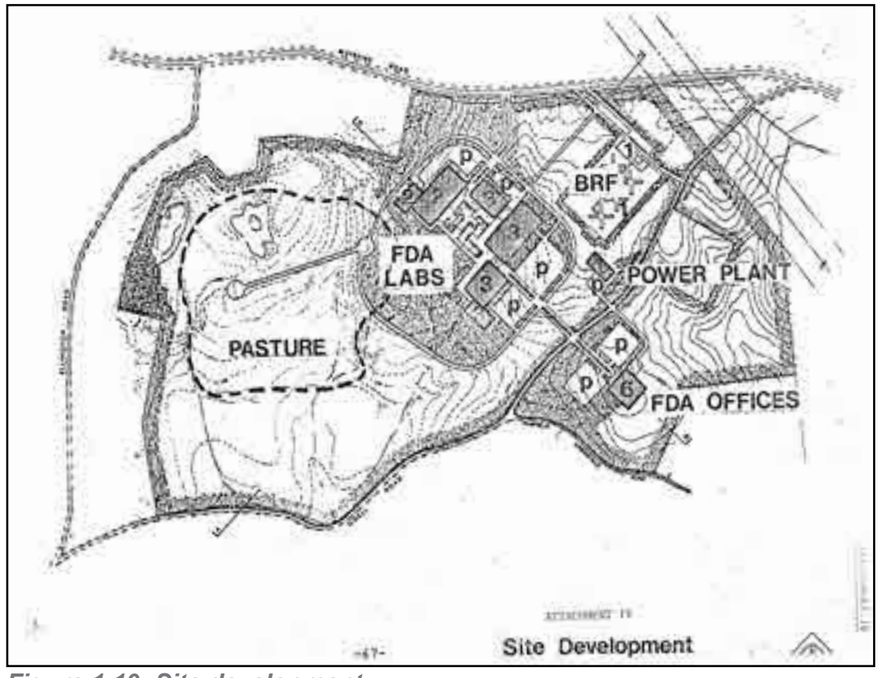


Figure 1-10: Site development

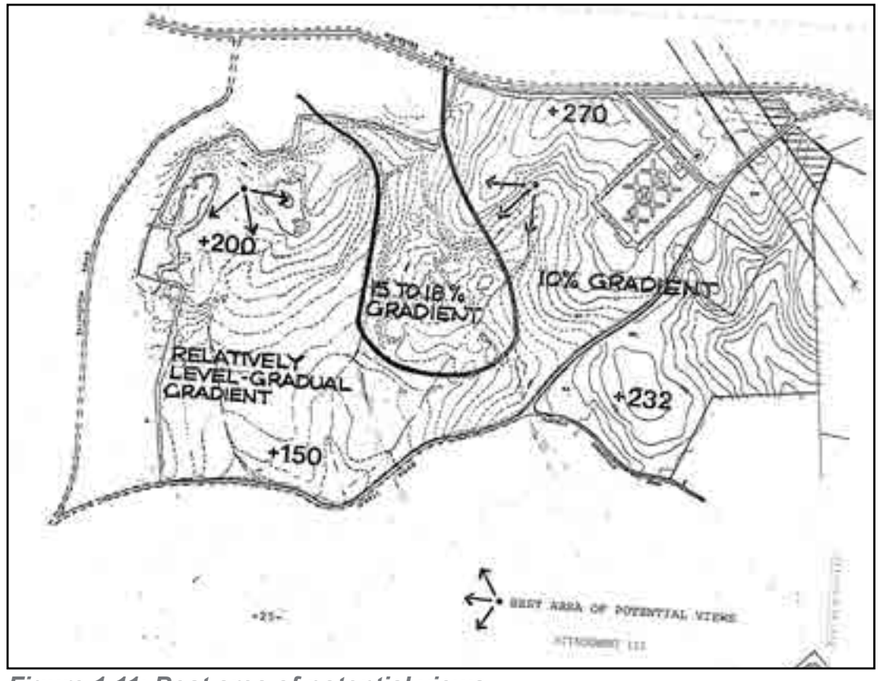


Figure 1-11: Best area of potential views

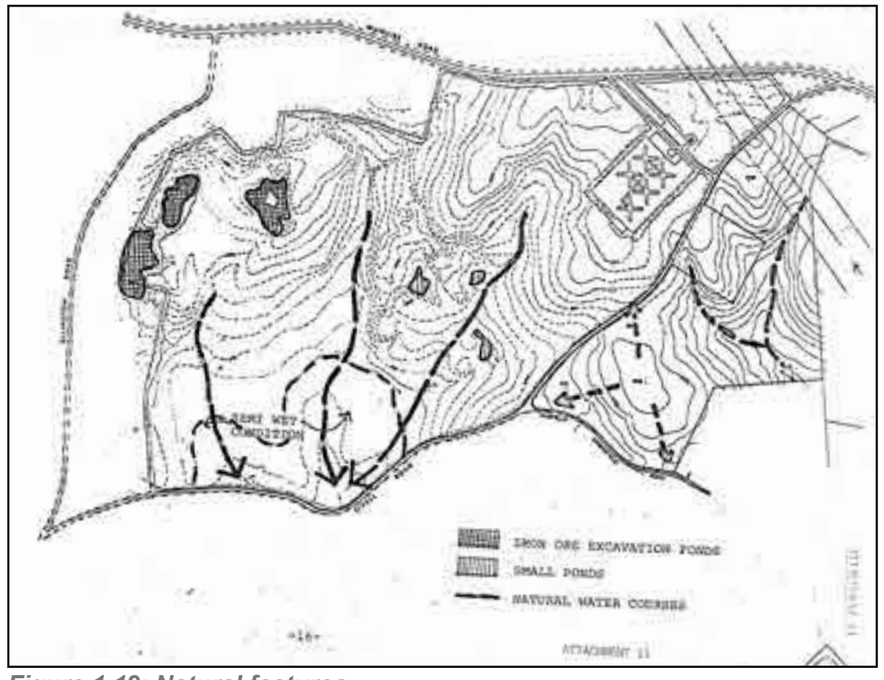


Figure 1-12: Natural features

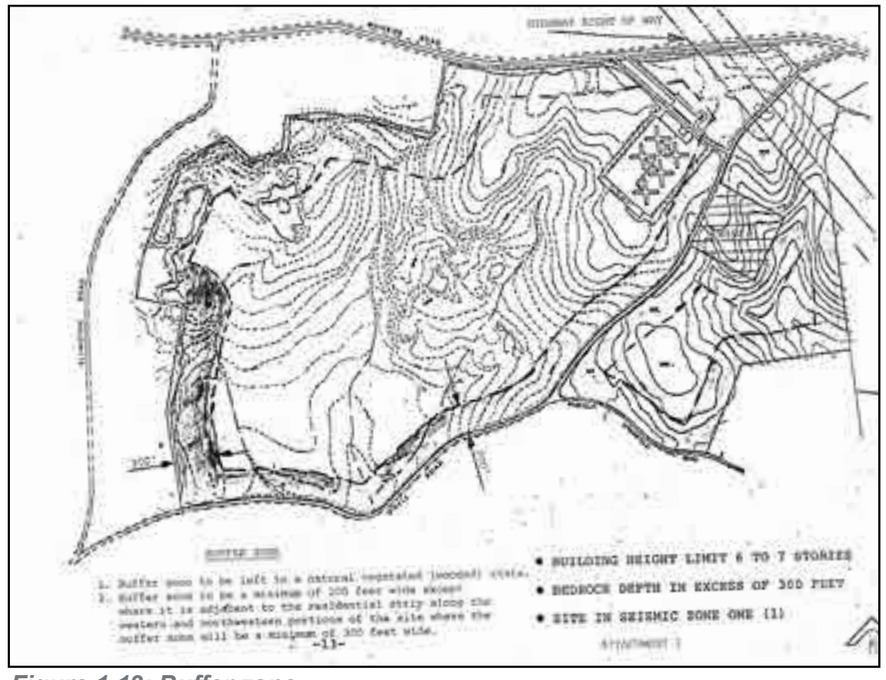


Figure 1-13: Buffer zone

1.2.2 FDA's influence

FDA plays an integral role in the development of the plan because it owns the land and the BRF, and MOD 1. It occupies the MOD 2 as a tenant of GSA. FDA will be responsible for implementing the Transportation Management Plan (TMP) and for ensuring transportation management strategies outlined in the TMP are carried out.

1.2.3 Planning Process

The planning process for the MRC Master Plan began in the fall of 2020. The development of the Master Plan has been supported by three major project components:

1. As part of FDA's consolidation onto federally owned campuses, the 2018 MRC LUFS was developed. This LUFS included a high-level assessment of the potential for new development at the MRC. The LUFS put forward three development scenarios, from low to high density, and identified related costs. From the fall of 2020 through the summer of 2021 three conceptual alternatives were developed as a first step towards a Draft Master Plan to guide future development at the MRC. An informational meeting with NCPC was held on February 4, 2021. The Draft Master Plan Report will be submitted to NCPC for review on June 4, 2021 and NCPC is anticipated to approve the draft at its September 2, 2021, meeting.

2. To comply with the National Environmental Policy Act (NEPA), an EIS was undertaken as part of the master planning process. A Purpose and Need Statement was established in the fall of 2020. The scoping period for the EIS was held from January 4, through February 11, 2021. The environmental effects of the proposed development were studied in the spring and a Draft EIS has been completed early summer of 2021, followed by a Public Review over the summer. The Final EIS will be prepared in early 2022 and the Record of Decision (ROD) is expected to be finalized mid to late 2022. Chapter 4 further detail environmental considerations and impacts.

3. To ensure compliance with the National Historic Preservation Act (NHPA) the Master Plan will need to identify, assess, and resolve adverse effects to historic structures or landscapes. As part of the assessment, the APE was determined in January 2021. As required by Section 106 of the NHPA, Consulting Parties were identified and informational meetings were held with Consulting Parties in March and April 2021. As no historic properties have been identified, the Maryland Historical Trust (MHT) has agreed that there is no need for a Memorandum of Agreement (MOA) or a Programmatic Agreement (PA). Chapter 4 further details the historical considerations and impacts.

The planning process considered a range of options for proposed development at the MRC leading to one No-Action Alternative and the three Action Alternatives. Other options for development have been discounted because of various environmental constraints and limited connectivity to the existing campus. Chapter 3 further details the land use considerations and the action alternatives.

Comments received through consultation with federal, state, and county agencies will inform the planning process. At the conclusion of the Final EIS, a ROD will outline the preferred alternative for the Master Plan and describe measures to mitigate any potential environmental impacts from implementation of the Master Plan.

1.2.4 Related Studies

- LUFS, August 2018
- Draft TMP, Summer 2021
- Draft EIS, Summer 2021
- Determination of Eligibility (DOE) for the National Register of Historic Places (NRHP), February 2021
- Phase I Archaeological Survey, January 2021

FDA is also currently undergoing two phases of Laboratory studies: Ph 1- Program of Requirements (POR) and Infrastructure Study / Survey & Mechanical, Engineering, Plumbing; Ph 2 - Lean Lab Assessment. The studies will:

- assess the future laboratory needs, special requirements, and timeframes for the MRC;
- survey and evaluate the existing infrastructure and systems for the future needs,
- provide flexibility in the alternatives which allows for a mixture of functions and operations; adapts to the sometimes unpredictable and everchanging nature and complexity of the products that the FDA regulates, and
- evaluate the effectiveness and efficiency of the existing laboratories; and identify improved utilization (right-sizing) or whether new spaces are required beyond the existing building footprint.

1.3 Master Plan Goals

The goals of the Master Plan are to:

Image & Mission - Reinforce FDA's image as a leading scientific institution and to:

- foster employee retention and attraction,
- create a collegial environment to foster scientific interaction,
- be an environmental steward, preserve open space, enhance site's natural features, and
- embody the highest principles of sustainable design.

Economics - Create a more efficient and cost-effective agency:

- reduce dependencies on leased facilities,
- maximize on-site population to streamline operations,
- utilize shared facilities, and
- reduce travel times to and from meetings and conferences.

Environmental Stewardship - Protect the site's tree canopy, maintain biodiversity, minimize runoff, and create a sustainable campus and to:

- minimize land coverage,
- convert surface parking lots into building pads,
- create both zero net energy & zero net water facilities, and
- utilize innovative stormwater practices.

Transportation - Foster effective transportation solutions to minimize traffic and parking, reinforce the innovative existing policies and to:

- welcome commuter bus services of public transportation authorities on site,
- create an on-site transit hub,
- continue to subsidize vanpools,
- phase future parking based on the impact of autonomous vehicles, and
- coordinate a future shuttle service with other agencies.

1.4 Master Plan Compliance

The Draft Master Plan is subject to review by NCPC to ensure the plan is consistent with the Federal Elements of NCPC's Comprehensive Plan for the National Capital. The Comprehensive Plan is a unified plan comprised of two components: (a) the Federal Elements (prepared by NCPC) and (b) District Elements (prepared by the District of Columbia). The Federal Elements, which are consistent with federal requirements and guidance, include an introduction, action plan, and eight thematic sections (elements). The Federal Elements are guided by three principles, which aim to:

1. accommodate federal and national capital activities,
2. reinforce smart growth and sustainable development planning principles, and
3. support local and regional planning and development objectives.

The Action Alternatives need to be consistent with the guiding principles of the Federal Elements of the Comprehensive Plan. The expansion of the campus aims to encourage efficiency, increase productivity, and foster collaboration, which is consistent with the goals outlined in the Federal Workplace Element. As part of the expansion, a TMP will be developed. The overarching objective is to encourage employees to use alternative means of transportation to commute to the campus such as carpooling or public transit. This will help alleviate traffic congestion and improve air quality which is consistent with both the Transportation and Environment Federal Elements. Additionally, all Action Alternatives need to be constructed and operated in an energy efficient and sustainable manner, meeting Leadership in Energy & Environmental Design (LEED®) Gold certification and net zero energy and water usage standards, which is consistent with the Federal Environment Element.

The MRC Master Plan also needs to comply with the continued effort of FDA to consolidate its operations. Over the last decade, FDA has consolidated most of its activities at the White Oak Campus at the Federal Research Center (FRC). As mentioned, this campus is home to FDA's headquarters and may also be referred to as FDA FRC. Chapter 3 further details the relationship to FDA White Oak campus at the FRC, the Federal Elements and the design and development guidelines.

1.5 Regional Context

Within the regional context, the Master Plan aims for a clustering of activities to foster collaboration and inspire employees to continually innovate while serving the public. The Master Plan supports the goal of creating timeless and enduring structures and spaces. Figure 1-15 shows surrounding community including FDA White Oak campus, USDA Campus, Beltsville Information Management Center (BIMC), a U.S. Department of State facility, MD Army National Guard, Capitol Technology University and Montpelier Elementary School.

1.5.1 Planned Developments

Within 20 minutes of driving distance of the MRC, there are seven planned new developments of significance (see Figure 1-14):

1. Konterra Business Park
Construct a $1.75 billion mixed-use development on 2,200 acres of retail, research, and technology campuses including 1.4 million square feet (sf) of building space, more than 1,000 residential units, and 348 acres reserved for a governmental, educational, or corporate facility according to KLNB, a commercial real estate services firm (KLNB, 2020).

2. Brick Yard
125-acre development bordering U.S. 1 between Muirkirk Road and Contee Road. The Brick Yard Urban Industrial is planned on 70 acres of the site and will include 700,000 square feet of multi-purpose industrial buildings. 50 acres of the site will be developed for residential uses as Brickyard Station (Jackson Shaw, 2021).

3. Bureau of Engraving & Printing (BEP)
Construction of an approximate 1 million sf Currency Production Facility on 100 acres at the BARC (USACE, 2021).

4. BARC Demolition
Demolition of 22 buildings and associated infrastructure at BARC (USDA-ARS, 2020).

5. High-Speed Superconducting Magnetic Levitation (MAGLEV) System
Highspeed train line between Baltimore, MD and Washington, DC with a stop at the Baltimore-Washington Thurgood Marshall Airport according to Maryland Department of Transportation (MDOT) MTA, 2021).

6. Maryland Army National Guard - National Guard Parking Lot Improvements
The National Guard is currently increasing the size of their parking lot. This project includes removal of forested vegetation in the East Parcel on the property where the National Guard is located.

7. FDA FRC Master Plan
Master Plan that provides a framework for development at the FRC for up to 18,000 employees and up to an additional 1.6 million gsf of office space and 377,382 gsf of special/shared use space. The FRC is approximately 10.9 driving miles west from the MRC (GSA, 2018).

1.5.2 Local Plans and Requirements

The 2018 LUFS defined the areas for potential development based on the following manmade and natural boundaries:
- Site boundaries
- Stream valleys
- Floodplains
- Security setbacks
- Other non-buildable areas

See Figure 1-16.

1.5.3 Land Use and Development

Federal Land Use Planning
The Federal Elements related to FDA Master Plan include:

- Urban Design - The Urban Design Element promotes design and development in the National Capital Region (NCR) that reinforces its role as the capital and fosters a welcoming and livable environment.

- Federal Workplace – The Federal Workplace Element aims to strategically locate the federal workforce in a consolidated, efficient manner that encourages higher productivity and collaboration while emphasizing the NCR's importance in the federal workforce.

- Transportation Element – The Transportation Element promotes a diverse transportation network that meets the needs of commuters while protecting and preventing environmental degradation. The element encourages the use of public transit and other alternative modes of transportation to improve traffic and air quality conditions in the region.

- Federal Environment – The Federal Environment Element encourages the federal government to be a leader in environmental stewardship and sustainability (NCPC, 2016).

- Historic Preservation - The Historic Preservation Element seeks to preserve, protect, and rehabilitate historic properties in the NCR.

- Parks and Open Space - The Parks & Open Space Element aims to protect and enhance parks and open spaces within the NCR for recreation, commemoration, and environmental and educational benefits.

The Federal Elements, specifically pertaining the design guidelines, are further detailed in subchapter 3.11.

Prince George's County Land Use Planning
The MRC is located within Prince George's County in Planning Area 62 – South Laurel / Montpelier, which in turn is part of Subregion 1. The approved Prince George's County Master Plan for Subregion 1 (Subregion 1 Master Plan) does not discuss the MRC or identify the study area for specific development (M-NCPPC, 2010).

According to Prince George's County's 2035 Approved General Plan, the MRC is located in an area designated for institutional use, which is defined by social, institutional, or public facilities (M-NCPPC, 2014).

The zoning designation of the land uses surrounding the MRC, is described in more detail in subchapter 1.5.5. and Figure 1-17.

1.5.4 Natural Features

The natural features of the MRC include large, naturally wooded areas, and mown grass areas within the pastures. The rolling topography and natural resources enhance the employee and guest experience. See also subchapter 1.8 for a detailed description of the natural resources.

Figure 1-14: Planned developments near MRC

- MRC
- East Parcel
- Area of Environmental Assessment
- Prince George's County
- Proposed MAGLEV

1. Konterra Business Park
2. Brick Yard
3. BEP
4. BARC Demolition
5. MAGLEV System
6. Maryland Army National Guard - National Guard Parking Lot Improvements
7. FDA FRC Master Plan

0 0.5 1 Miles

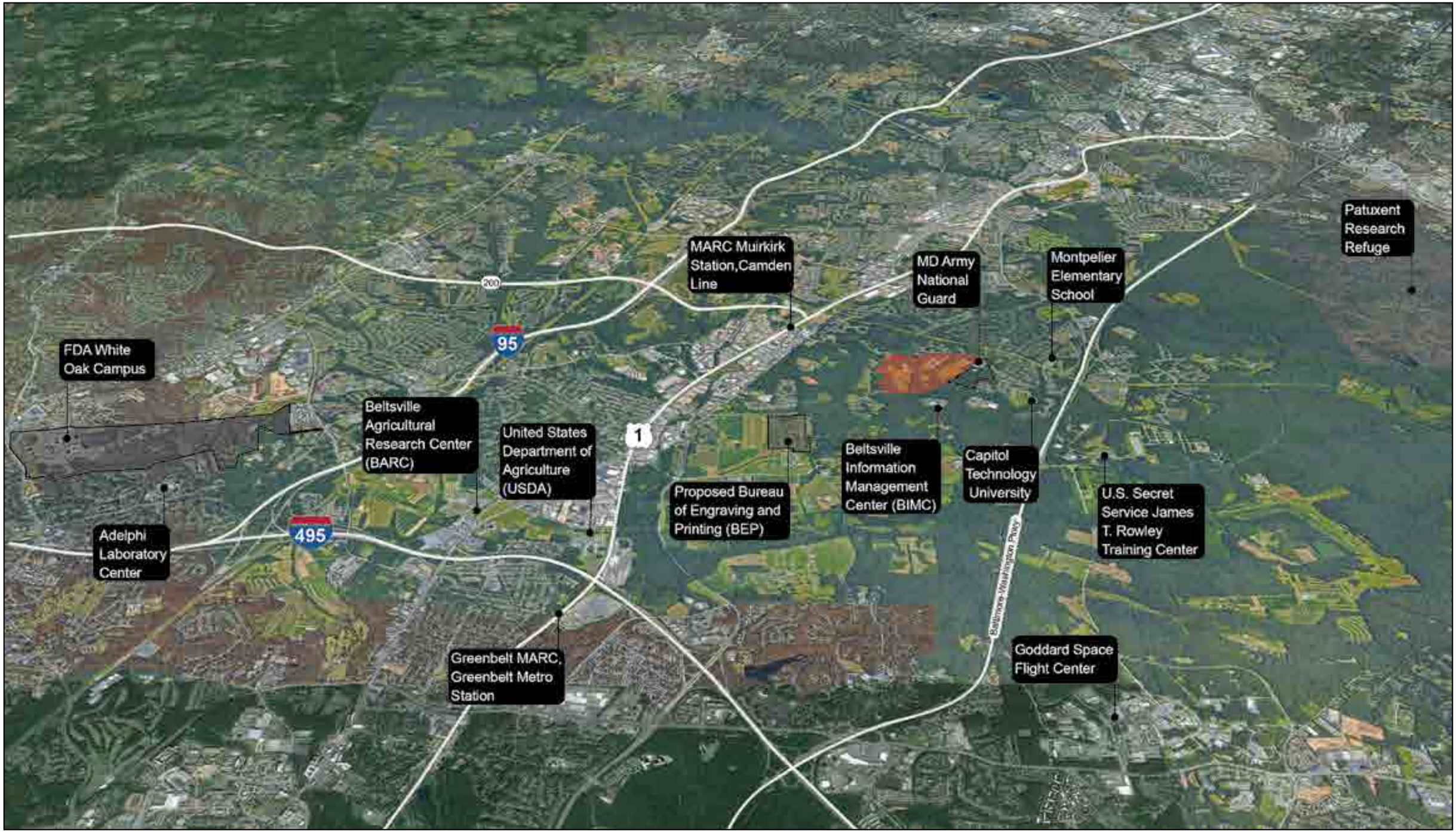


Figure 1-15: Surrounding community and federal facilities

MRC East Parcel

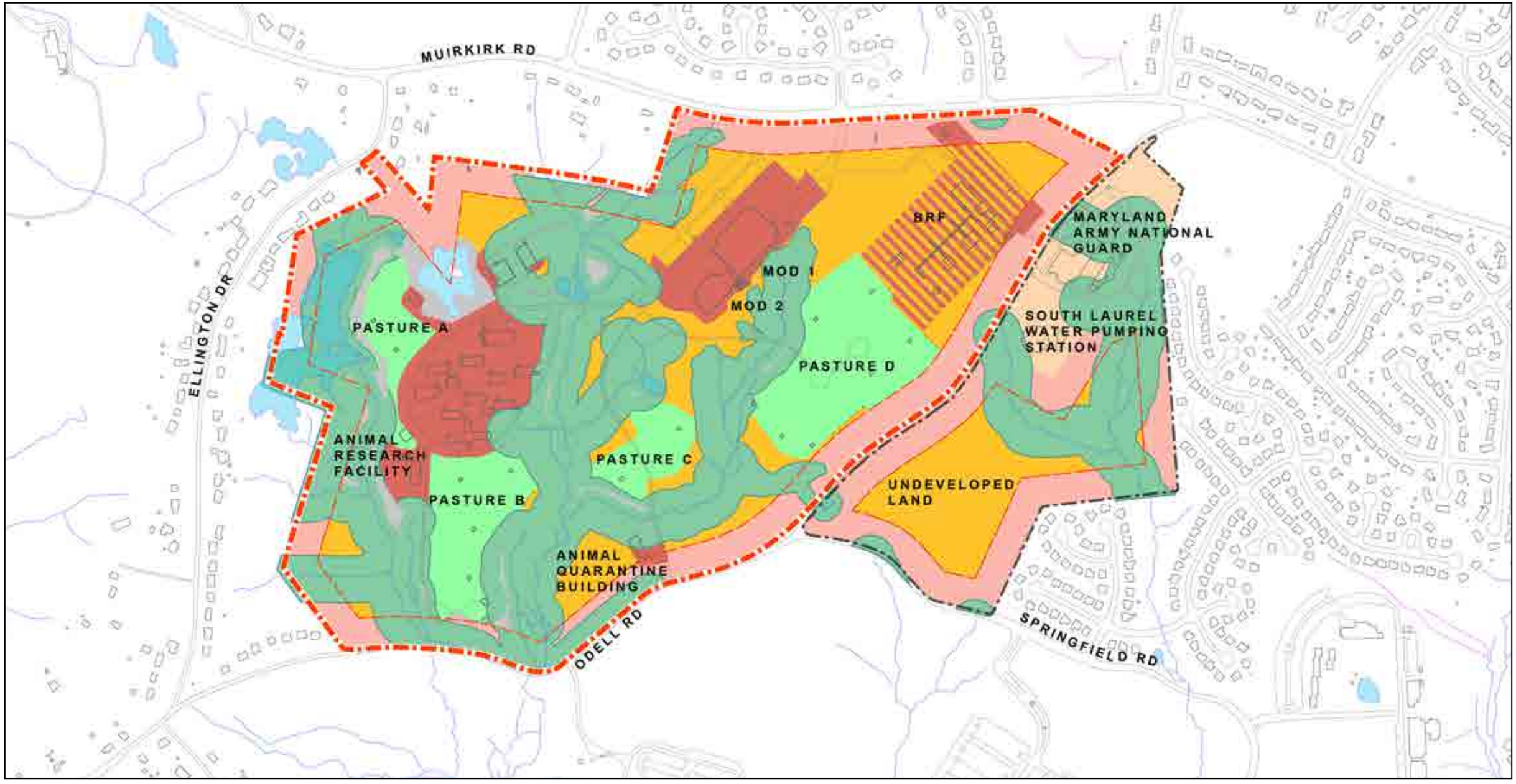


Figure 1-16: Site buildable area as identified in 2018 LUFS

1.5.5 Zoning

The surrounding zoning within a 2-mile radius of the MRC includes the following land uses:

- R-O-S (Reserved Open Space)
- R-R (Rural Residential)
- R-55 (Single Family Residential)
- I-2 (Heavy Industrial)
- E-I-A (Employment and Institutional Areas)

The dominant land use is R-O-S, which applies to approximately 51 percent of the area within a 1-mile radius of the MRC.

Prince George's County has proposed a rewrite of the Zoning Ordinance and Subdivision Regulations, which has not yet been approved. However, the proposed changes would not affect area around the site.

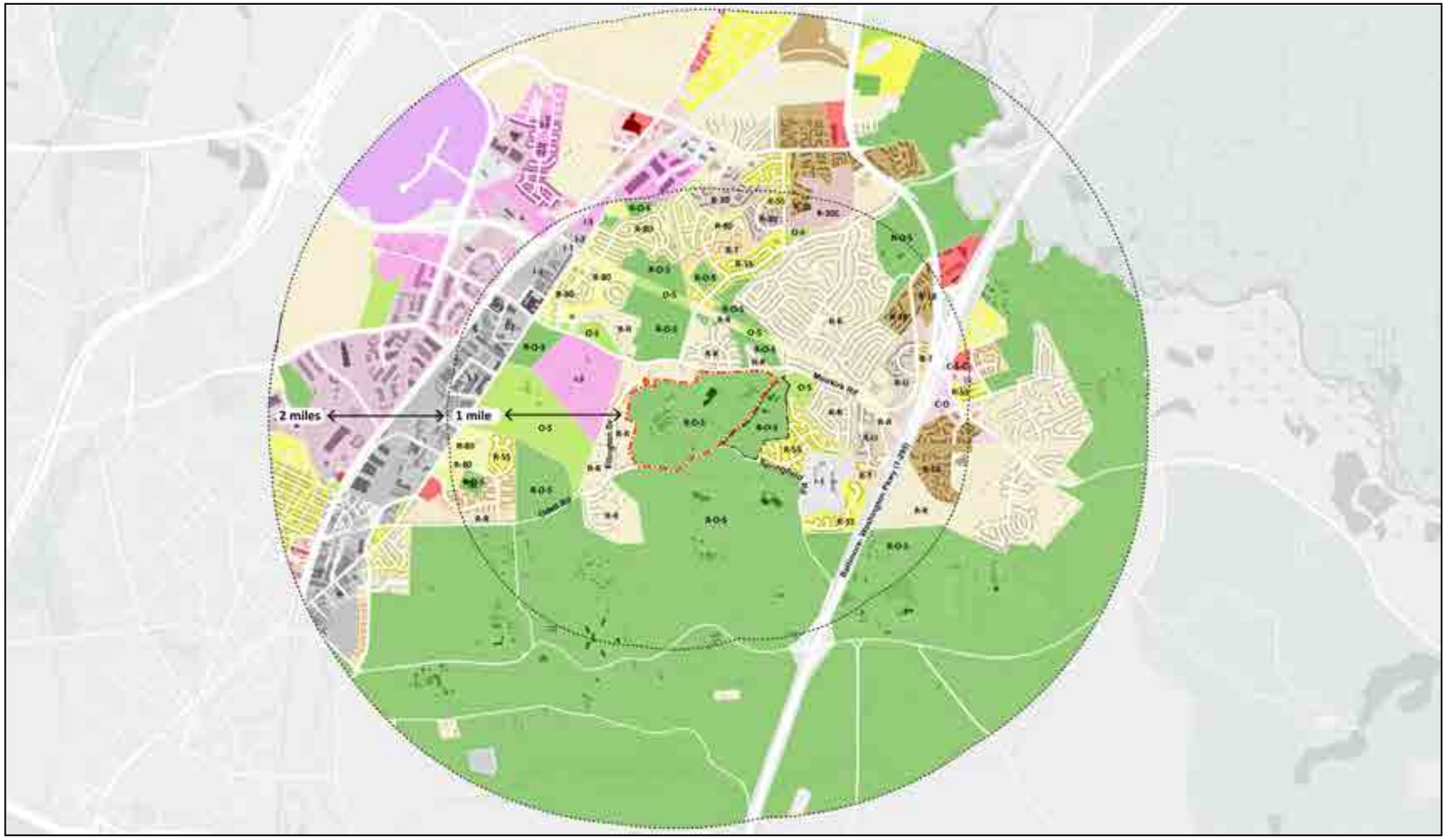
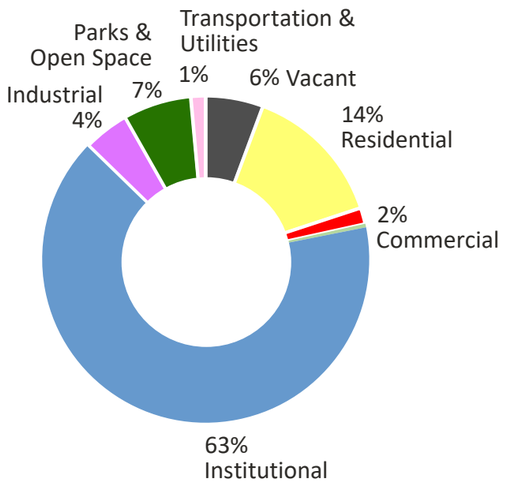


Figure 1-17: Surrounding zoning

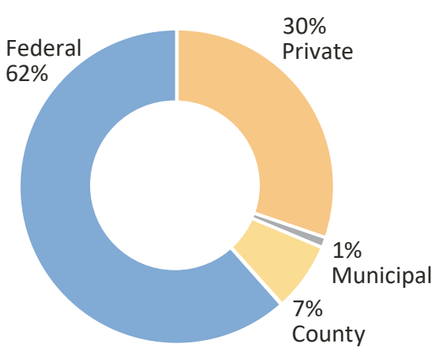
1.5.6 Land Use

A significant portion of the surrounding land within a 2-mile radius of the MRC (63 percent) has been zoned for institutional uses. The remaining 37 percent of the land is zoned for other uses, of which 14 percent residential and 7 percent parks and open space. Of the land zoned for institutional uses, 62 percent is owned by the federal government. Another 30 percent is privately owned. Prince George's County owns 7 percent and the Municipality only 1 percent.

Land use % within a 2-mile radius



Land ownership % within a 2-mile radius



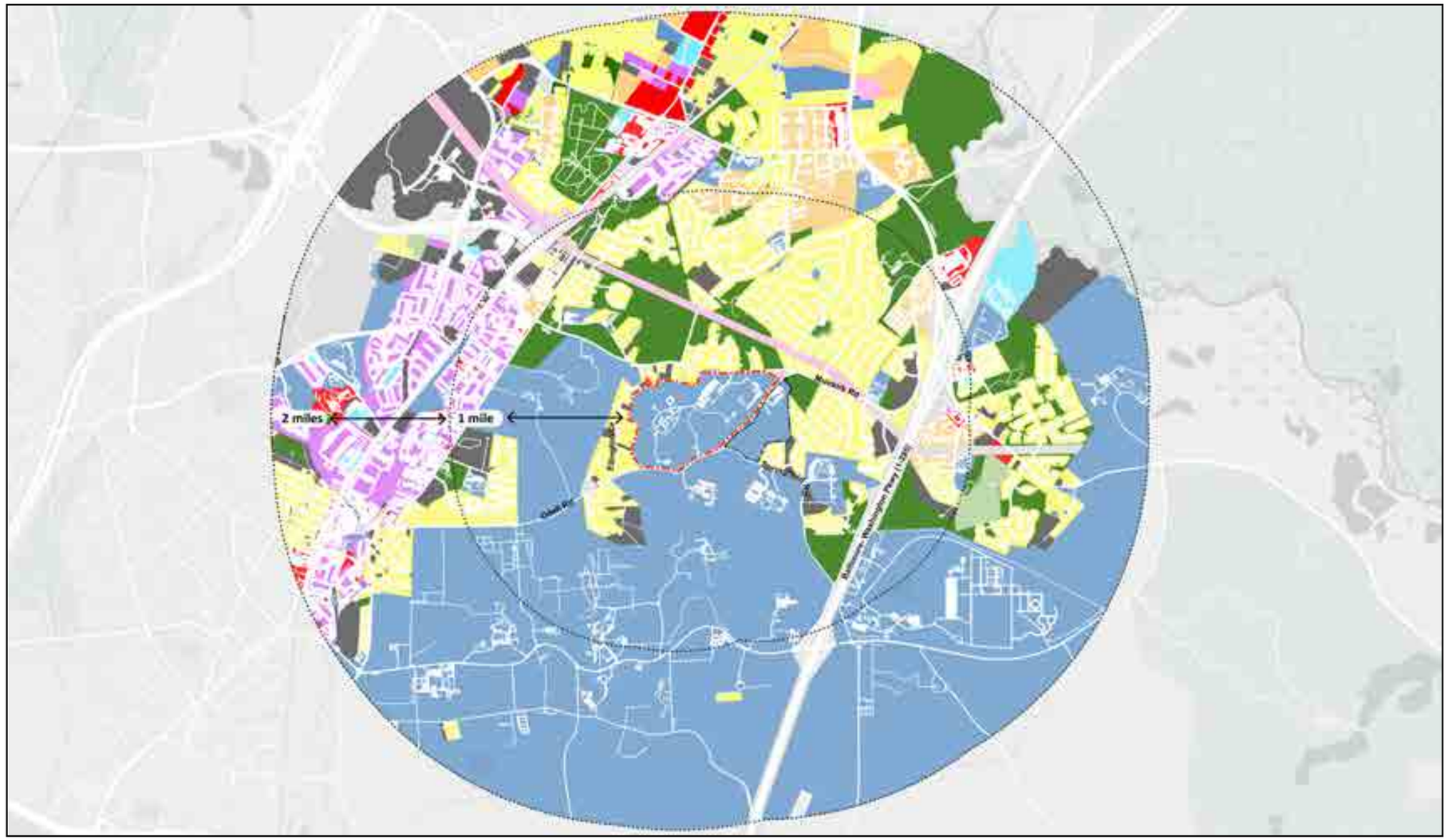


Figure 1-18: Land use

1.6 Muirkirk Road Campus

The current campus is centralized around the MOD 1 and MOD 2 which houses most of the staff, shown in Figure 1-22.

In addition to the built areas, the site includes open pasture areas. These areas are needed for livestock and are critical to CVM's large animal research program.

The northeast corner of the site contains the BRF which was the first building on the site. The original building has been partially demolished and new buildings have been added since. The high water table on the MRC site could affect the underground portions of the buildings.

The latest expansion to the MRC is MOD 2 which was built south of MOD 1. MOD 1 and MOD 2 are connected through a service corridor and share a loading dock.

Figure 1-19: Aerial oblique view looking north

1.6.1 Site Extents

The MRC concerns the 197-acre parcel to the south of Muirkirk Road and to the west of Odell Road. East of Odell Road is another 52-acre parcel. The East Parcel includes the approximate 23-acre home to the MD Army National Guard facility and 4 acres are in use for the South Laurel Pumping Station. The remainder of the approximately 25 acres, referred to as the undeveloped area of the East Parcel, is covered by natural woodlands. The East Parcel is bisected by a stream valley. In the previous master plans and the 2018 LUFS, the East Parcel was considered developable land. However, it should be noted that the Master Plan does not propose development on the undeveloped area of the East Parcel as will be detailed further in Chapter 3, subchapter 3.3.2.

See also the more detailed description of the area boundaries and parcel delineation at the beginning of the Master Plan Report.

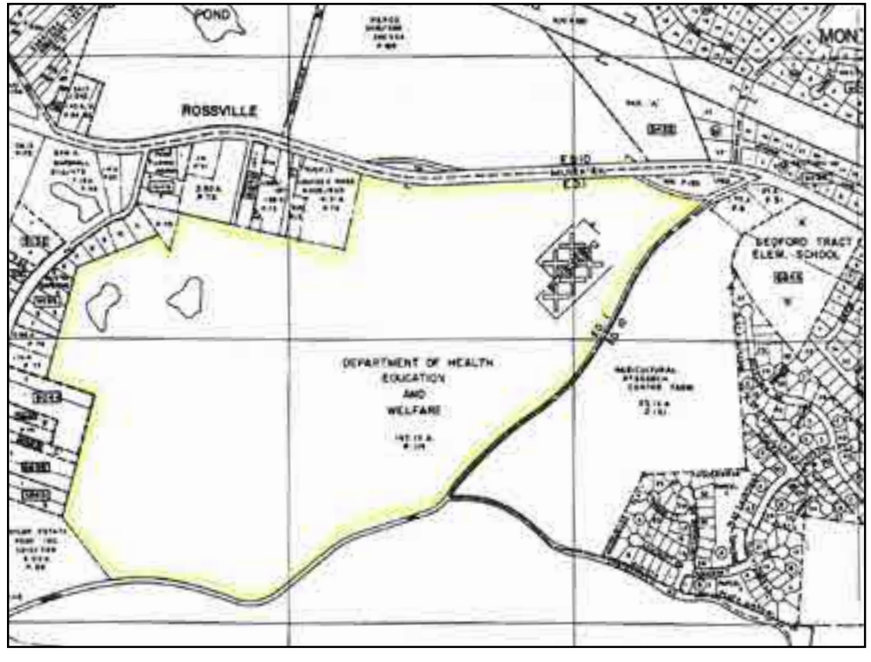


Figure 1-20: FDA MRC property map from property appraisal report (date unknown)

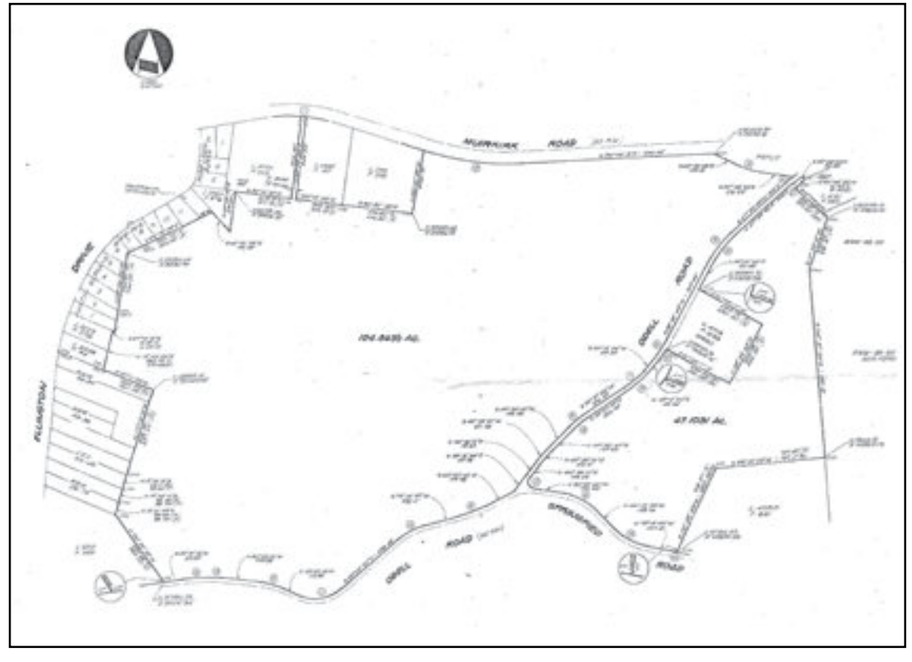


Figure 1-21: FDA MRC boundary survey, showing South Laurel pumping station boundaries, (dated June 1980)

Figure 1-22: Project boundary, areas, & places of interest

1.6.2 Beltsville Research Facility

The northeast portion of the site consists of what is remaining of the original one-story BRF built in the 1960's, and the former kennel grounds. There are also several sheds and small one-story structures in this zone, one of which is in use as an employee fitness center.

Site Photo Legend

1. Entrance into MRC view looking south from Muirkirk Road
2. Main entrance MOD 1 view looking south from access road
3. Service road east of main entrance of MOD 1 looking south
4. Entrance road looking east from main entrance road
5. Entrance road looking southeast towards the BRF
6. BRF building entrance
7. BRF looking southwest from the BRF parking lot
8. BRF (Fitness center)
9. BRF (Storage building)

Figure 1-23: Campus key plan

1 *Entrance into MRC view looking south from Muirkirk Road*

2 *Main entrance MOD 1 view looking south from access road*

3 *Service road east of main entrance of MOD 1 looking south*

4 *Entrance road looking east from main entrance road*

5 *Entrance road looking southeast towards the BRF (with National Guard Facility in the back)*

6 *BRF building entrance*

7 *BRF looking southwest from the BRF parking lot*

8 *BRF (Fitness center)*

9 *BRF (Storage building)*

Site Photo Legend

10. Covered walkway view looking at the BRF from south
11. BRF hazardous waste storage facility
12. BRF looking south towards pasture
13. BRF covered walkway looking north
14. Entrance road looking northwest towards MOD 1 parking lot
15. Outdoor dining near MOD 1 looking southwest
16. West of MOD 1 looking south
17. MOD 1 looking from west
18. MOD 1 view looking from north
19. West perimeter of MOD 1
20. MOD 1 loading area view looking from west

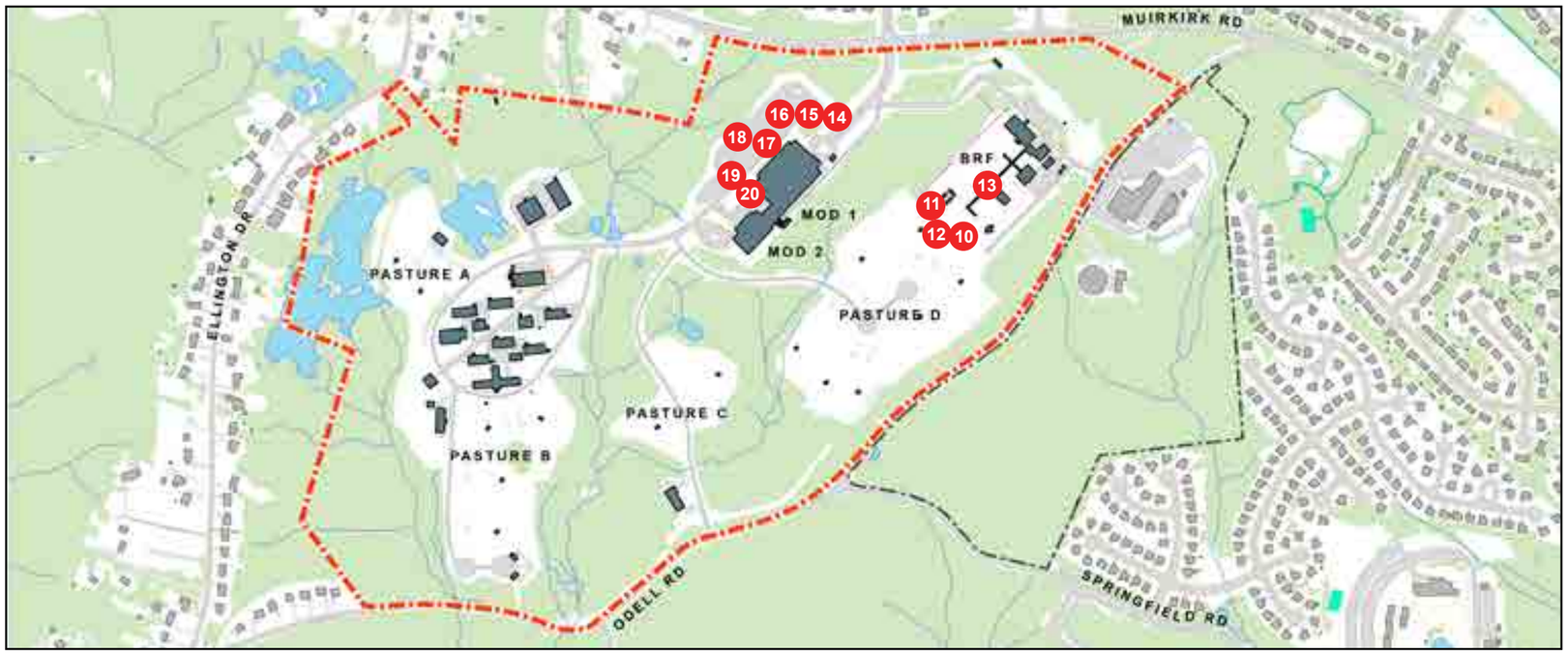


Figure 1-24: Campus key plan

10 *Covered walkway view looking at the BRF from south*

11 *BRF hazardous waste storage facility*

12 *BRF looking south towards pasture*

13 *BRF covered walkway looking north*

14 *Entrance road looking northwest towards MOD 1 parking lot*

15 *Outdoor dining near MOD 1 looking southwest*

16 *West of MOD 1 looking south*

17 *MOD 1 looking from west*

18 *MOD 1 view looking from north*

19 *West perimeter of MOD 1*

20 *MOD 1 loading area view looking from west*

1.6.3 Module 1 and Module 2

MOD 1 and MOD 2 are two connected buildings located within the northwestern portion of the property. Currently, MOD 1 and MOD 2 are in use as office and laboratory space. MOD 1 was built in the 1980's and MOD 2 in the 1990's. MOD 2 is part of the Animal Research Facility and was originally known as Building A.

1.6.4 Pastures A - D

The pasture areas are in the southeastern part of the property. The southern portion of the campus is not being considered for new development. This is a secured area with access limited to authorized FDA staff only.

1.6.5 Animal Research Facility Buildings B – H

The southern portion of the campus is dedicated to the Animal Research Facility and consists of a series of small structures that are connected by paved roads to the pastures. This portion of the campus includes an animal quarantine building at a gated entrance onto the site from Odell Road south of the intersection with Springfield Road. See also Figure 0-4 for a map that details the pasture areas and identifies Buildings B-H.

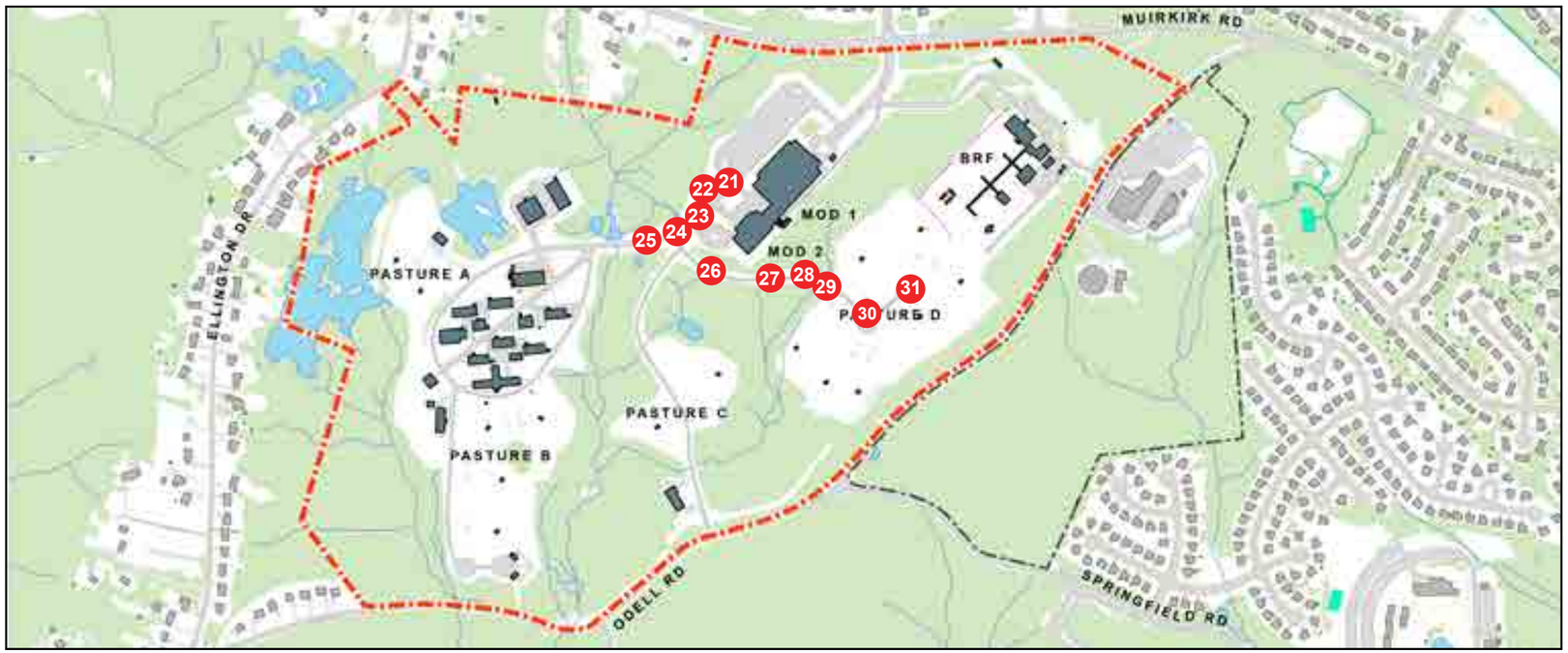


Figure 1-25: Campus key plan

Site Photo Legend

21 Outdoor seating area at loading areas for MOD 1 and MOD 2
22 MOD 2 and dining area looking north
23 MOD 2 view looking north
24 Southern entrance gate looking north at MOD 1 and MOD 2
25 Looking south from southern entrance gate towards lab
26 Road towards southern pasture
27 Entering the pasture from the west
28 Pasture area looking southeast
29 Center of pasture looking south
30 Pasture looking north
31 Pasture looking east

21 *Outdoor seating at loading areas for MOD 1 and MOD 2*

22 *MOD 2 and outdoor seating area looking northeast*

23 *MOD 2 view looking northeast*

24 *Southern entrance gate looking north at MOD 1 and MOD 2*

25 *Looking south from southern entrance gate towards lab*

26 *Road towards southern pasture*

27 *Entering the pasture from the west*

28 *Pasture area looking southeast*

29 *Center of pasture looking south*

30 *Pasture looking north*

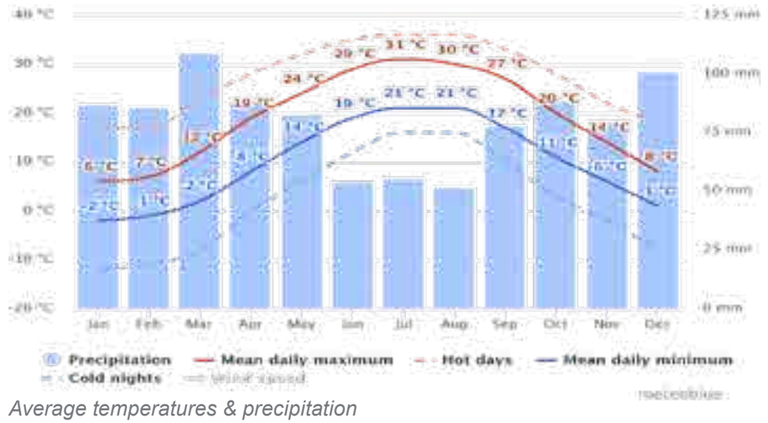
31 *Pasture looking east*

1.6.6 Climatic Conditions

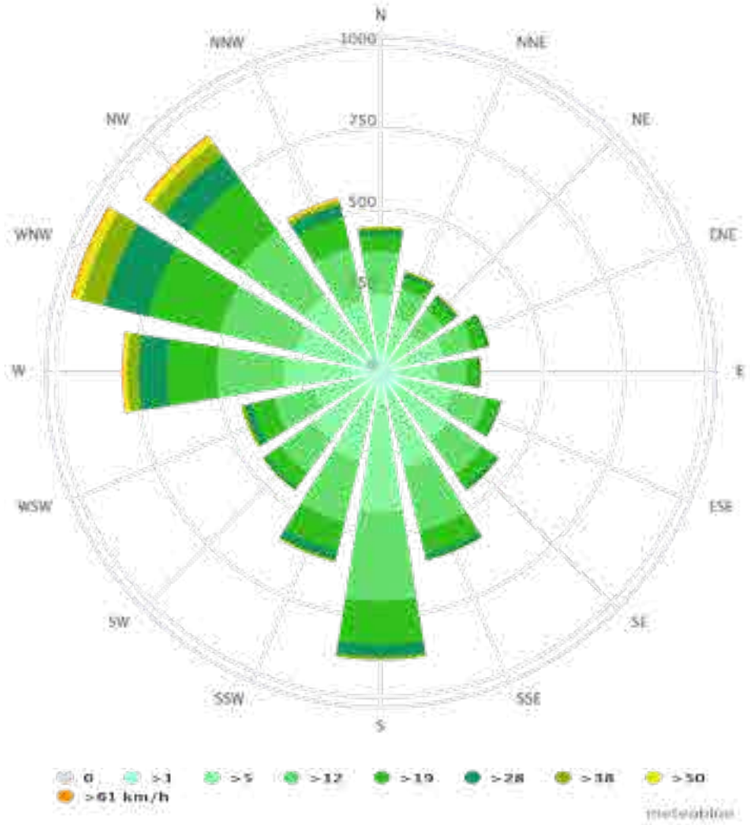
The MRC is oriented to the south and features a humid subtropical climate with hot and humid summers and short winters. Winters within the DC area can occasionally bring significant snowfall, while hot summer days can be moderately uncomfortable. Figure 1-26 provides localized climate information for Laurel, Maryland, the nearest urban agglomeration.

See Chapter 3, subchapter 3.12 for a more detailed analysis of the climatic conditions at the MRC.

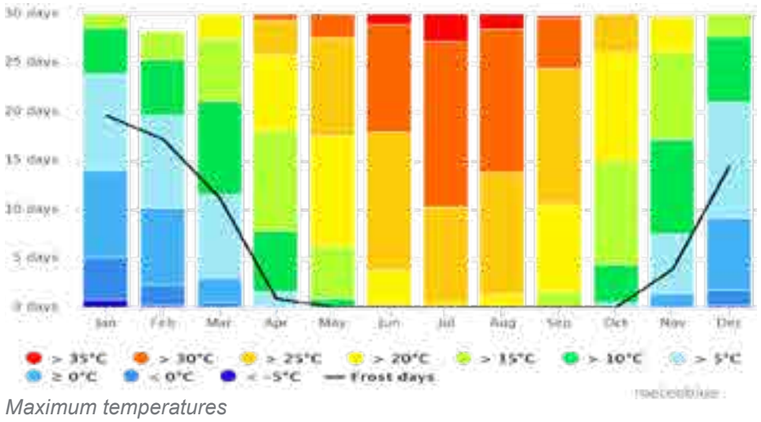
Solar path



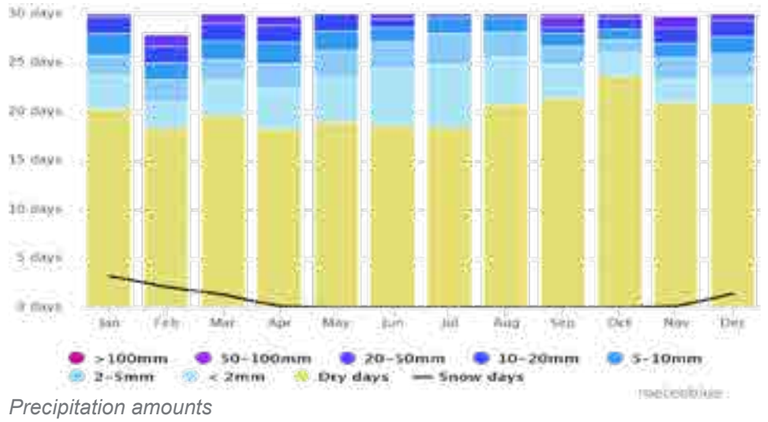
Average temperatures & precipitation



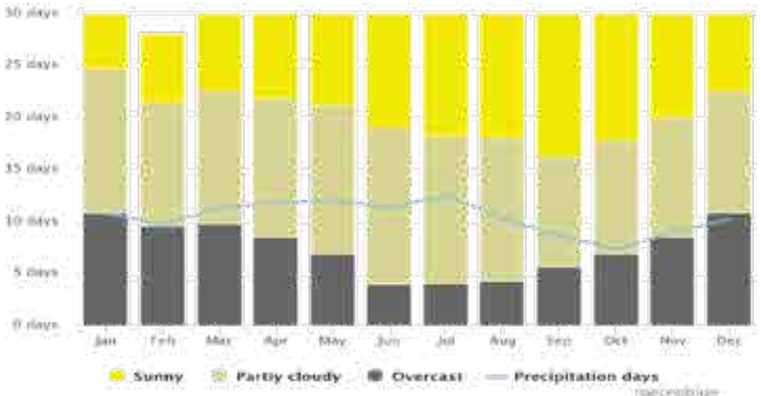
Average wind directions and speeds



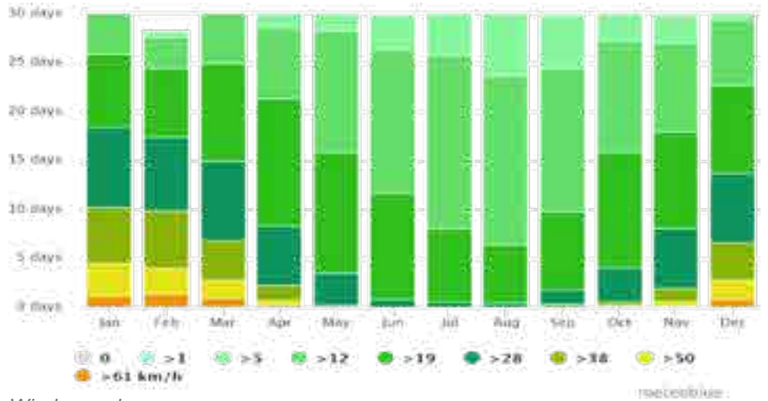
Maximum temperatures



Precipitation amounts



Cloudy, sunny, & precipitation days



Wind speed

Figure 1-26: Annual Climate information

1.6.7 Major Properties

Figure 1-27 depicts property boundaries as well as major property owners within the study area.

U.S. Government: The MRC, as well as the areas to the immediate south and east of the property, are owned by the U.S. government, with frontages facing Muirkirk and Odell Roads. The Beltsville Agricultural Research Center is located south of the MRC with an entrance on Odell Road.

M-NCPPC: is a public agency that administers parks in Montgomery and Prince George's County. The agency owns parcels to the north and northeast of the campus.

Other Property Owners: Most of the smaller parcels, especially to the northeast and west of the MRC, are privately owned residential properties.

Figure 1-27: Properties & significant landowners

1.6.8 Zoning

As mentioned earlier in subchapter 1.5.5, the MRC is currently zoned as Reserved Open Space (R-O-S). R-O-S zones encourage the preservation of agriculture, trees, and open space (see Figure 1-28) (PG Co., 2019). However, it should be noted that Federal properties are not subject to county land use or zoning regulations (M-NCPPC, 2010). Zoning in the immediate area around the MRC includes Reserved-Open-Space, Rural-Residential, and One-Family Detached Residential.

Figure 1-28: Zoning

Prince George's County Zoning Regulations

The Prince George's County zoning regulations, applicable to the MRC, can be summarized as follows:

• The height of buildings with all allowed uses may be increased to 120 feet, provided that, for each 1-foot increase in height, setbacks from all property lines are increased by 1-foot (according to The County Code of Prince George's County, Section 27-442, Table V - Building Height (Maximum in Feet, Main Building))

• A maximum building height of 35 feet is required for a minimum of 50 feet front yard setback

• At least 10 percent of the lot coverage needs to be impervious

Landscape Buffer

A 100-foot landscape buffer for the buildings is required according to the 1981 Master Plan adopted by Prince George's County and NCPC.

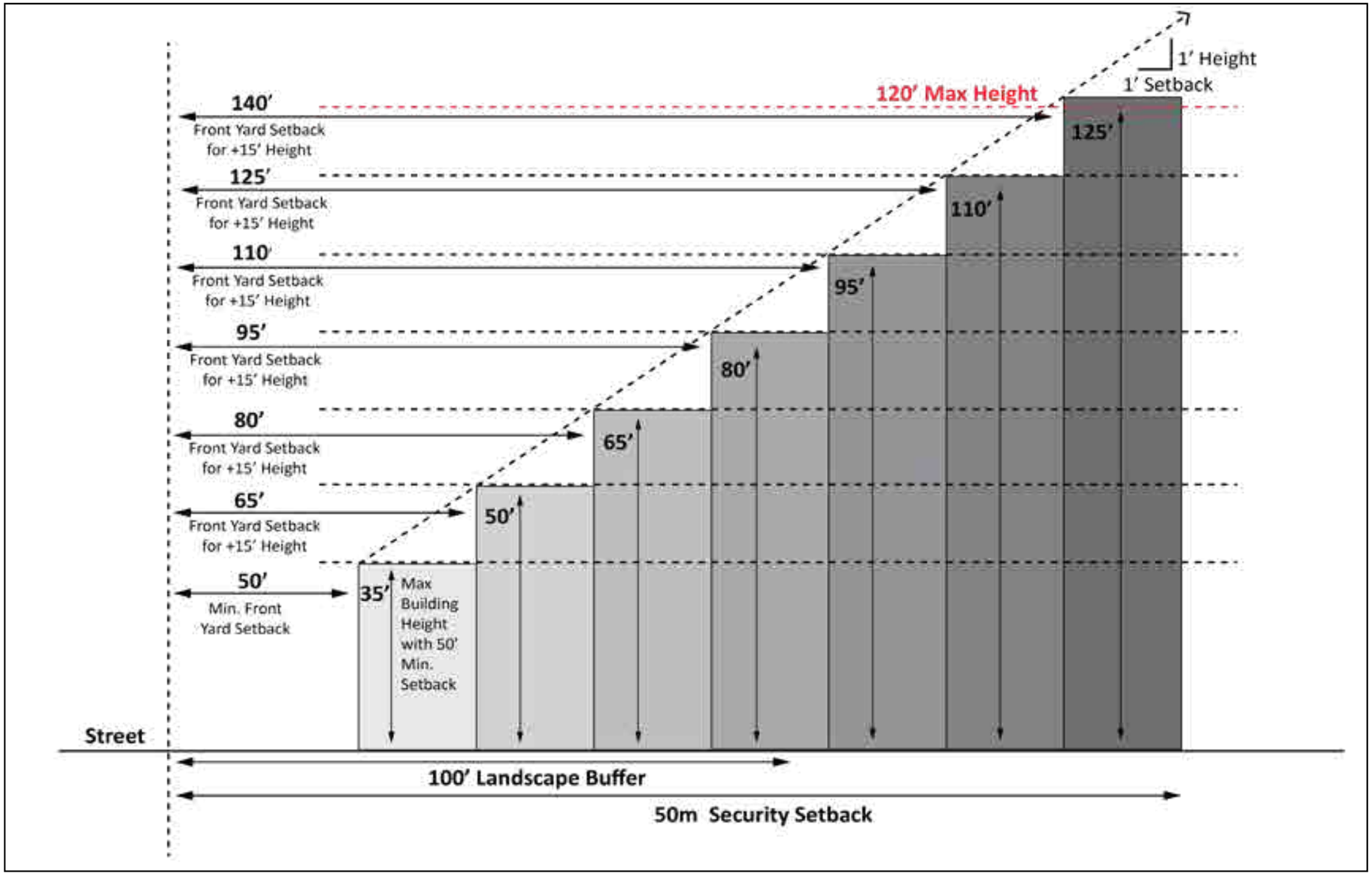


Figure 1-29: Zoning analysis

1.6.9 Campus Hardscapes

The building footprints and hardscapes at the MRC can be summarized as follows:

- hardscapes are limited to three clusters of buildings surrounded by woodlands and pastures
- facilities have been built on the relative flat lands bisected by streams and slopes
- older buildings are lower and smaller than later additions
- all parking concerns surface parking, no parking structures
- a single, 2-lane asphalt road connects the three clusters of built structures at the BRF, MOD 1 and MOD 2 and the Animal Research Facility
- pastures can be reached through a single lane paved but unmarked road (see Figure 1-30)

The existing conditions in terms of impervious surfaces has been analyzed in greater detail in the EIS. See subchapter 1.8.9 for the relevant EIS findings.

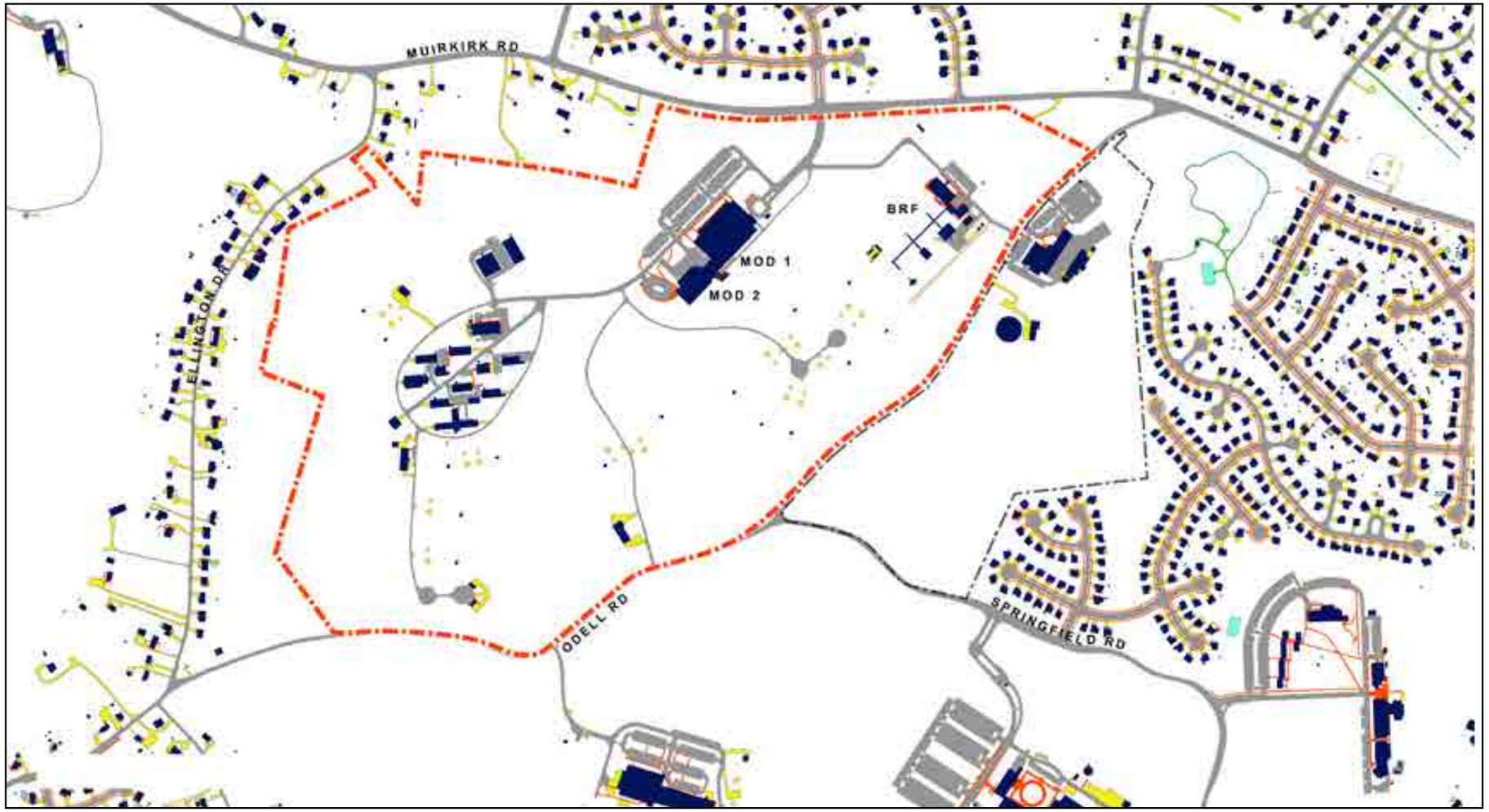


Figure 1-30: Campus hardscapes

1.6.10 Security Constraints

The campus is surrounded by a 10 feet high chainlink fence with barbed wire on top. The service roads and pastures areas are also fenced in with a 10-foot chainlink fence. The other interior fences are 7 feet high. Most interior fences are also topped with barbed wire which adds another foot to the height. The four pasture areas are also surrounded by chainlink fences, while the individual pastures within the pasture areas are separated by wood post and barbed wire fences. No development is proposed in the restricted use/limited access areas within the Animal Research Facility of the CVM.

The primary access to the site is via the main entrance at Muirkirk Road. The secondary entrance at Odell Road is currently closed. The other two restricted access gates are for the Animal Research Facility.

Any new development on the campus should maintain a 164 feet (50 meter) site setback from the perimeter of the site.

The security level for federal civilian and government agencies is based on an Interagency Security Committee (ISC) Standard. The MRC is a security level III facility. See Chapter 3, subchapter 3.14 for more information regarding security constraints.

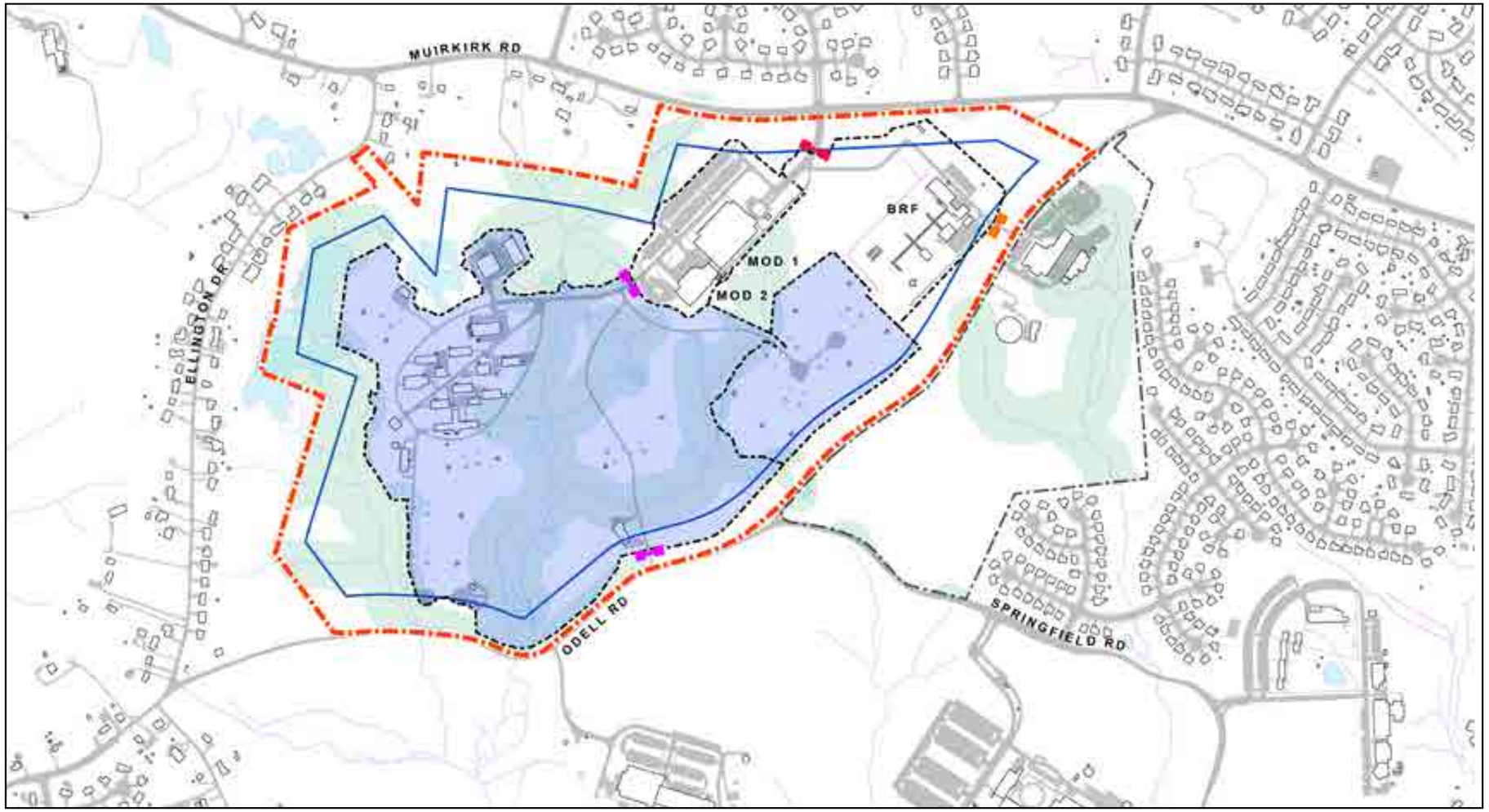


Figure 1-31: Security constraints

1.7 Circulation

1.7.1 Vehicular Circulation

Figure 1-32 depicts the existing vehicular circulation network at the MRC.

1.7.2 Transit

The campus is served by one bus route (RTA Route 302). The MRC is the end stop for the route. The Muirkirk MARC station is located approximately 1.5 miles west of the site. Generally, other than by car, the MRC is not easily accessible due to a lack of easy and convenient transit, and safe pedestrian, and bicycle connections.

1.7.3 Parking

Currently, the parking on the site has not been an issue. Both MOD 1 and MOD 2 as well as the BRF have sufficient surface parking spaces in direct proximity to the buildings. There are approximately 320 parking spaces for the current 300 employees. This equals a parking ratio of one parking space for every 0.9 employee.

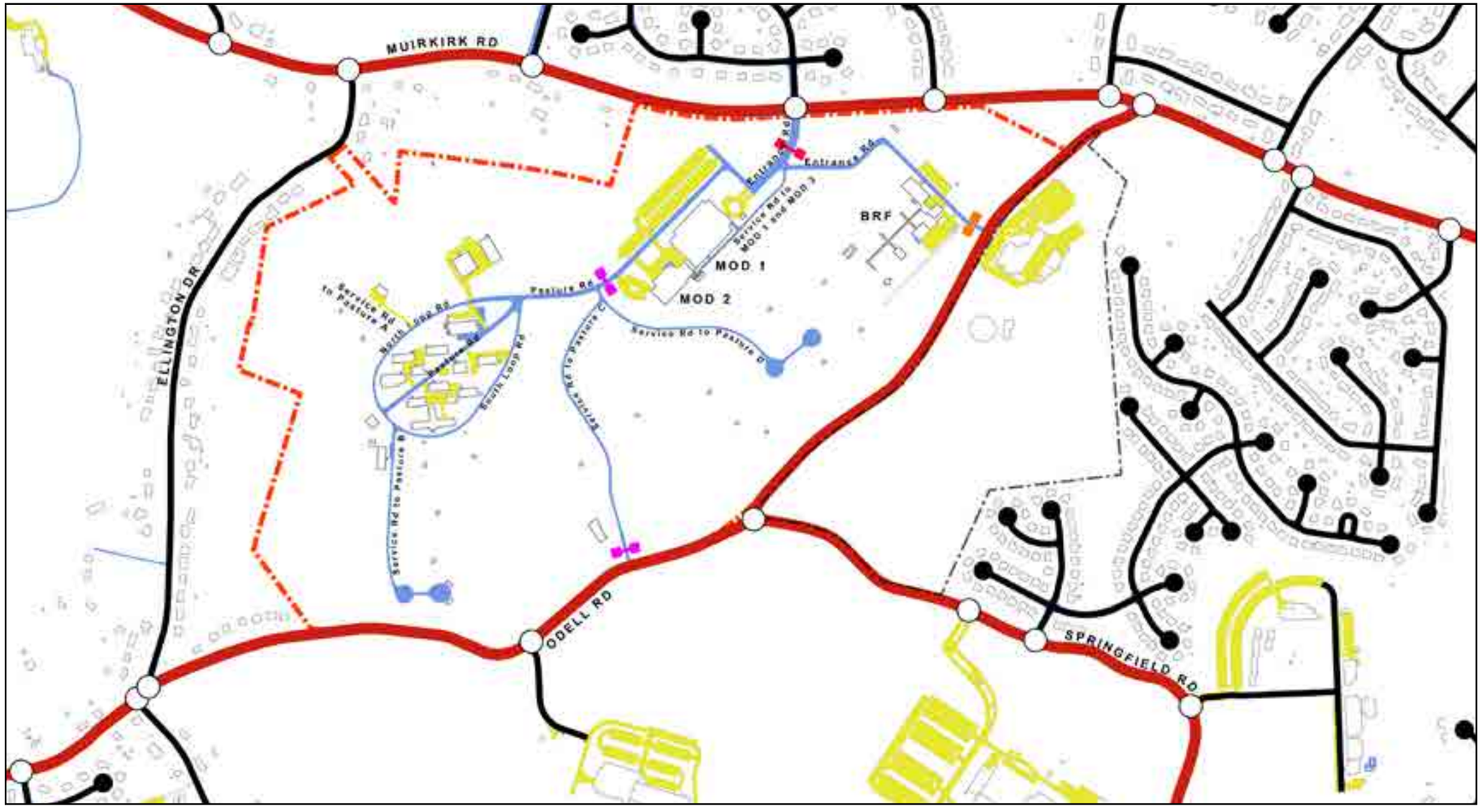


Figure 1-32: Vehicular circulation

1.7.4 Pedestrian and Bicycle Circulation

Figure 1-33 depicts the pedestrian and bicycle circulation network at the MRC. There are no bike paths on the site and the walkways are limited to a few sidewalks within the existing built areas. There are no dedicated pedestrian or bicycle connections between MOD 1 and MOD 2 and the BRF or other uses on the site.

As a general rule, public ways need to comply with the Americans with Disabilities Act of 1990 (ADA) and the Architectural Barriers Act Accessibility Standard (ABAAS) for federal property. Muirkirk Road and Odell Road do not provide pedestrian access that is ADA compliant. The MRC has only a few sidewalks to provide pedestrian access from/to the surface parking lots. These sidewalks are ABAAS compliant.

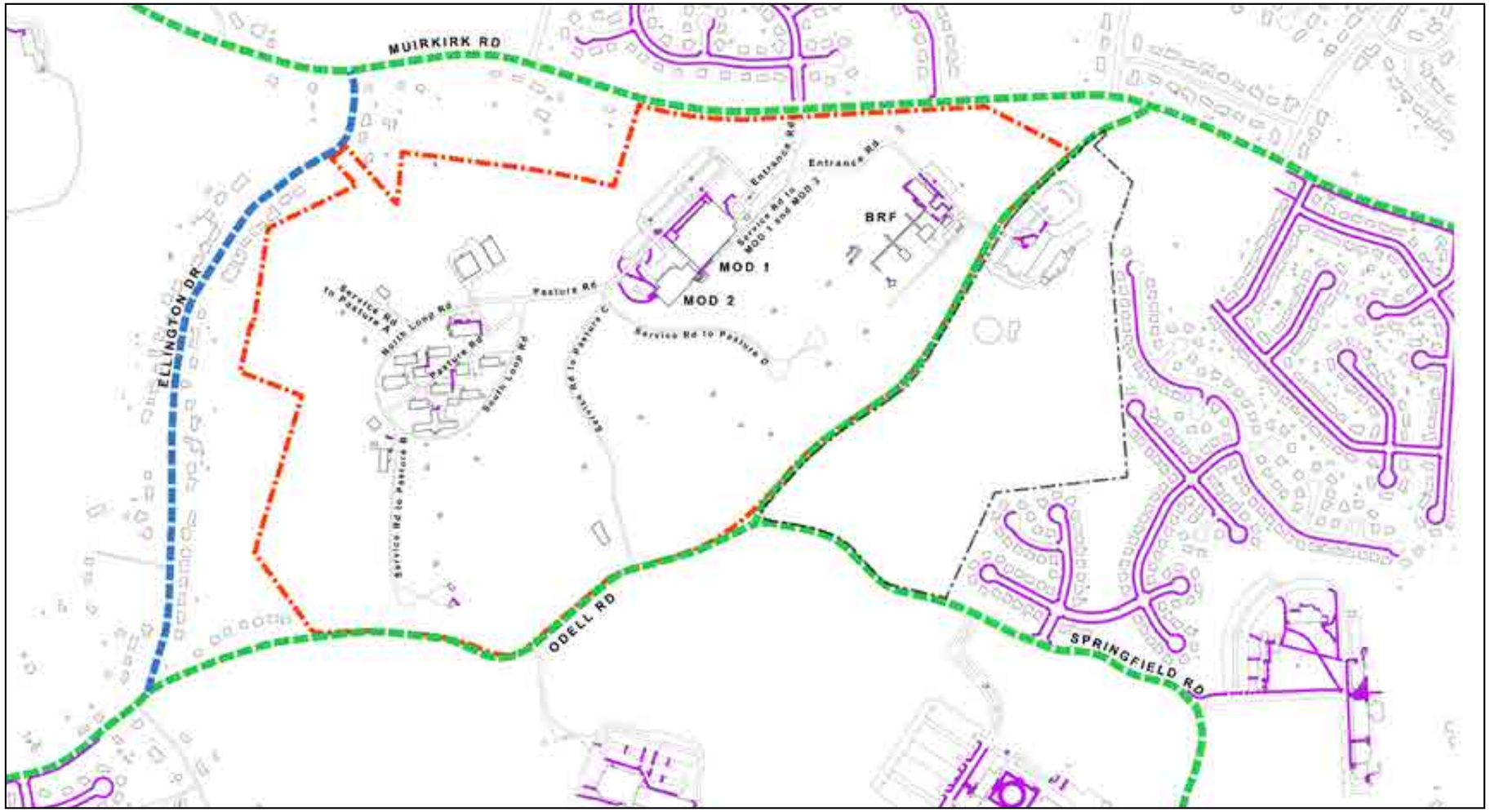


Figure 1-33: Parking, pedestrian, & bicycle network

1.8 Natural Resources

The existing natural features of the MRC defining the built-up land at the campus include large, wooded areas, wooded stream valleys, and mown grass areas. The rolling topography, water resources, and the wildlife habitats enhance the employee experience.

1.8.1 Soils and Topography

The topography of the MRC is generally rolling with elevations ranging from 100 to 300 feet above mean sea level (msl) (see Figure 1-34). In the northern portion of the MRC, the elevation is 250 feet above msl with steep slopes along the unnamed tributary of Beaverdam Creek. The area between MOD 1 and MOD 2 and the BRF has elevations around 200 feet above msl.

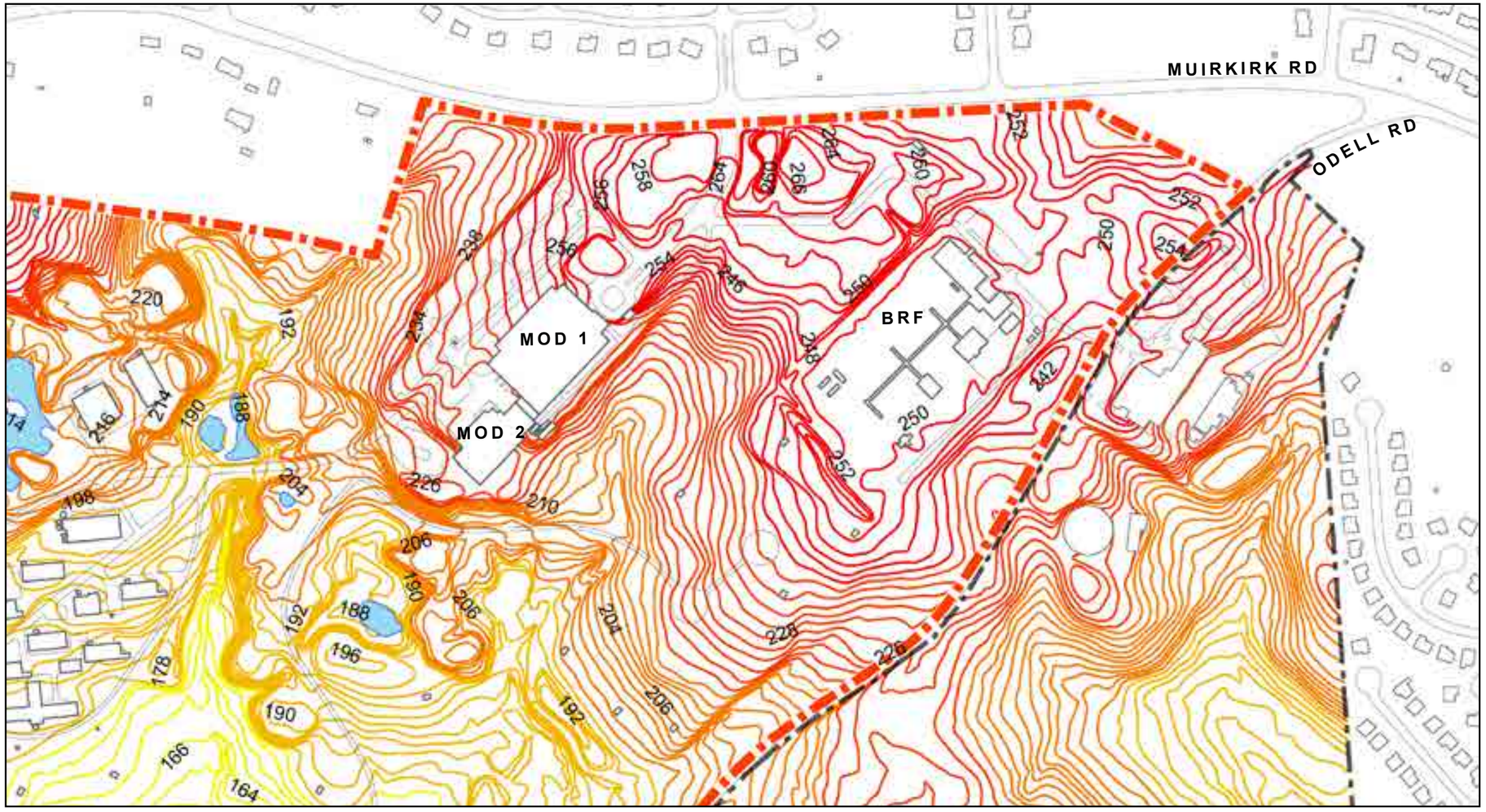


Figure 1-34: Site topography

There are 13 soil types within the study area as defined in the EIS. The most abundant soil type within the study area is Downer-Hamonton complex (5 to 10 percent slopes), which accounts for 29.9 percent of the soils and can be found running through the center of the study area and between MOD 1 and MOD 2 and the BRF. The next most abundant soil type is classified as Galestown-Urban land complex (0 to 5 percent slopes), which accounts for 13.5 percent and is located primarily beneath portions of MOD 1 and MOD 2 and the BRF. The study area is comprised of 4.1 percent of Urban land-Udorthents (0 to 5 percent slopes complex), which includes asphalt, buildings, or other structures. This soil unit is located beneath the BRF. Evesboro-Downer complex (15 to 25 percent slopes) accounts for 2.4 percent of the study area and has the potential for severe hazard erosion (USDA, 2020). This soil unit is found within the study area to the southwest of MOD 1 and MOD 2. Other soil units within the site that are listed in Table 1-1 are rated to have a slight to moderate hazard for erosion (Maryland iMap, 2018).

Soil Unit	Map Unit Name	Acres in Study Area (%)	Hydric	Prime Farmland Status	Erosion Hazard
CcC	Christiana-Downer complex, 5 to 10 percent slopes	5.1 (6.7%)	Yes	Farmland of Statewide Importance	Moderate
DoC	Downer-Hamonton complex, 5 to 10 percent slopes	29.9 (39.3%)	No	Farmland of Statewide Importance	Moderate
EwB	Evesboro-Downer complex, 0 to 5 percent slopes	4.0 (5.3%)	No	Prime Farmland if Irrigated	Slight
EwC	Evesboro-Downer complex, 5 to 10 percent slopes	8.4 (11.0%)	No	Not Prime Farmland	Moderate
EwD	Evesboro-Downer complex, 10 to 15 percent slopes	0.1 (0.2%)	No	Not Prime Farmland	Moderate
EwE	Evesboro-Downer complex, 15 to 25 percent slopes	1.8 (2.4%)	No	Not Prime Farmland	Severe
GbB	Galestown-Urban land complex, 0 to 5 percent slopes	13.5 (17.7%)	No	Not Prime Farmland	Slight
GbD	Galestown-Urban land complex, 5 to 15 percent slopes	1.2 (1.5%)	No	Not Prime Farmland	Moderate
RuB	Russett-Christiana-Urban land complex, 0 to 5 percent slopes	4.4 (5.8%)	No	Not Prime Farmland	Moderate
SOD	Sassafras and Croom soils, 10 to 15 percent slopes	0.5 (0.6%)	No	Not Prime Farmland	Moderate
UdgB	Udorthents, reclaimed gravel pits, 0 to 5 percent slopes	1.7 (2.2%)	No	Not Prime Farmland	Slight
UdgD	Udorthents, reclaimed gravel pits, 5 to 15 percent slopes	2.4 (3.2%)	No	Not Prime Farmland	Moderate
UruB	Udorthents, reclaimed gravel pits, 5 to 15 percent slopes	3.1 (4.1%)	No	Not Prime Farmland	Moderate

Table 1-1: Soil Map units within the study area

1.8.2 Steep Slopes

Figure 1-35 depicts the steep slopes found on the MRC and its surroundings. The slopes on the site range between 15-25 percent and greater than 25 percent. Slopes of greater than 15 percent are considered to have severe hazard of erosion which renders large portions of the site unsuitable for construction (USDA, 2020). Steep slopes are more prevalent along the outside edges of the study area. Steep slopes exist around the edge of MOD 1 and MOD 2 and the BRF, most likely due to grading during construction. See also Table 1-1 for the erosion hazards associated with slopes.

Figure 1-35: Steep slopes

1.8.3 Vegetation

Vegetation on the MRC is a mixture of large areas of dense deciduous trees and individual shade trees, with thick ground cover in wooded areas. The following land cover classifications can be found within the MRC.

Urban or Built-up Land
Urban or built-up land is comprised of area of intensive use with much of the land covered by structures, including cities, towns, villages, strip-developments, transportation, power, communication facilities, and areas such as those occupied by mills, shopping centers, industrial and commercial complexes, and institutions that may be isolated from urban areas. Urban land within the MRC includes a green buffer zone, FDA development, roads, and parking lots. Landscaped areas comprise most of the vegetation within the urban and developed land of the MRC.

Mixed Forest Land
Forested areas have a mix of trees that lose their leaves at the end of the frost-free season or at the beginning of the dry season and trees that retain needles throughout the entire year. There are approximately 57.8 acres of forest within the study area, delineated into nine forest stands. Most of the forests within the study area are defined as an early mid-successional. An early mid-successional forest is a transitional stage between a young and mature forest.

Forest Stand 1
Forest Stand 1 is an early mid-successional forest that encompasses 5.9 acres within the study area. The stand is characterized by small to medium-sized hardwood trees with consistent canopy cover ranging from 85 percent to 89 percent cover.

Forest Stand 2
Forest Stand 2 is an early mid-successional forest that encompasses 1.7 acres within the study area. Dominant trees in the stand are commonly found in the 6-9.9 inches or 10-17.9 inches Diameter at Breast Height (dbh) size classes with a canopy cover averaging 82 percent.

Forest Stand 3
Forest Stand 3 is a mid-successional forest that encompasses 5.1 acres within the study area. Dominant trees in the stand are commonly found in the 10-17.9 inches dbh size classes. Canopy cover at the MRC ranges from 86 percent to 91 percent. Forest Stand 3 has a high capacity to support wildlife due to the stand being outside of the perimeter fence and the presence of streams and wetlands within the stand.

Forest Stand 4
Forest Stand 4 is a mid-successional forest that encompasses 6.6 acres within the study area. Dominant trees in the stand are commonly found in the 10-17.9 inches dbh size class. Canopy cover averaging 89 percent. There is potential for wildlife in this stand due to the streams and wetlands that occur on site.

Forest Stand 5
Forest Stand 5 is a mid-successional forest that encompasses 3.5 acres within the study area. Dominant trees in the stand are commonly found in the 2-5.9 inches dbh size class. Canopy cover indicates 85 percent closure. There is potential for wildlife in this stand due to the streams and wetlands that occur on site and the lack of development around the stand.

Forest Stand 6
Forest Stand 6 is an early mid-successional forest that encompasses 14.4 acres within the study area. Trees in the stand are well established and are commonly found in the 10-17.9 inches dbh size class. Canopy cover provided by trees is generally high and ranges from 80-95 percent.

Forest Stand 7
Forest Stand 7 is an early mid-successional forest that encompasses 8.8 acres within the study area. Dominant trees in the stand are commonly found in the 10-17.9 inches and 18-29.9 inches dbh size classes. Canopy cover provided by the trees ranges from 80-95 percent across the plots. This stand has the potential to support wildlife due to it being located within a larger forested area and it is protected from roadways and other urban development.

Forest Stand 8
Forest Stand 8 is an early-successional forest that encompasses 5.5 acres within the study area. Dominant trees in the stand are commonly found in the 6-9.9 inches and 10-17.9 inches dbh size classes. Canopy cover provided by trees is lowest among stands, with a range of 55-80 percent cover.

Forest Stand 9
Forest Stand 9 is an early mid-successional forest that encompasses 6.3 acres within the study area. Dominant trees in the stand are commonly found in the 6-9.9 inches dbh size class or smaller. Canopy provided 65-85 percent cover for the plots (75 percent average), mostly due to the low number of dominant trees in the stand.

1.8.4 Wildlife

The large, wooded land areas and open pastures on the MRC support numerous wildlife species. The MRC has a high potential to support the mammal species listed below. The MRC has a mix of forest and maintained grass, which provides habitat and food sources to all the species. During onsite wetland/ waterway and forest delineations, evidence was seen of white-tailed deer (*Odocoileus virginianus*), squirrels (*Sciurius carolinensis*), rabbits, and groundhogs (*Marmota monax*). Amphibian and reptile species have a high potential to occur at the MRC due to the expansive wetlands and relatively undisturbed areas. Avian species were seen during the onsite investigations for wetlands/ waterways and forests. Due to the forested areas, fields, and wetlands on the MRC there is a potential for roosting, habitat, and nesting for the avian species.

Aquatic species have a slight chance to occur within the study area, due to the stream and wetlands that are present within the study area. The aquatic species could be found within the study area do not require large water systems. However, these species can be found in the streams. The pasture areas at the MRC also support grazing animals.

The study area was reviewed for the presence of rare, threatened, and endangered species. A review of the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) website determined that the federally threatened northern long-eared bat (*Myotis septentrionalis*) potentially exists within the study area (USFWS, 2021). In a letter dated January 27, 2021, Maryland Department of Natural Resources (MDNR) responded that there are no official State or Federal records for listed plant or animal species within the study area. The Master Plan maintains the large, forested areas on the site that provide habitat for the northern long-eared bat. Development would occur outside the roosting periods for the northern long-eared bat. These forested areas, along with the pasture areas on the MRC, may also provide habitat for migratory birds which are protected under the Migratory Bird Treaty Act (MBTA).

A pre-construction survey will be performed as a best practice to determine the presence of nests of migratory birds that have the potential to occur in the study area. If nests are identified, FDA aims to avoid vegetative clearing during the nesting period for those species. Trees removed for construction will be replaced to provide long-term mitigation for impacts to migratory bird habitat.

Figure 1-36: Forest stands

MRC
East Parcel
Forest Delineation

0 150 300 600 Feet

Forest Stand 1

Forest Stand 2

Forest Stand 3

Forest Stand 4

Forest Stand 5

Forest Stand 6

Forest Stand 7

Forest Stand 8

Forest Stand 9

Figure 1-37: Forest stands

1.8.5 Tree Cover

Figure 1-38 shows the existing tree cover on the MRC and surrounding areas. The development is constrained due to the presence of extensive woodlands in the study area. As mentioned in subchapter 1.8.3, there are approximately 57.8 acres of forest within the study area.

Figure 1-38: Tree cover

1.8.6 Tree Replacement Policies

Key findings based on the comparison of NCPC's Tree Preservation and Replacement Policies, Prince George's County Woodland and Wildlife Habitat Conservation Ordinance, and State of Maryland's Forest Conservation Act are:

1. NCPC's Preservation and Replacement Policies are the most restrictive set of regulations requiring replacement of one tree for every one tree removed (1:1).

2. Prince George's County Woodland and Wildlife Habitat Conservation Ordinance and the State of Maryland's Forest Conservation Act both require tree replacement based on conservation threshold acreage (a benchmark percentage of the total area of a site, including both forested and non-forested areas by which replanting acreage is calculated).

3. The only difference between the County and the State policy is the naming of the zoning code. Prince George's County Woodland and Wildlife Habitat Conservation Ordinance refers to site zoning as R-O-S whereas the State of Maryland's Forest Conservation Act refers to the same zoning code as Agriculture and Resources Areas.

The tree survey and replacement plan will need to be in in conformance with NCPC policy to 'Preserve – Transplant – Replace' trees. Although the MDE stormwater regulations do not include policies or requirements for tree replacement, projects subject to stormwater regulations do need to comply with the state or local forest conservation regulations and stormwater management permits are usually contingent on getting forest conservation approval.

Tree Policies	Overarching Goals	Key Objectives	Method	Replacement Requirement	Change
NCPC's Tree Preservation and Replacement Policies	Prioritizes tree preservation and offers alternatives to mitigate tree canopy loss if preservation is not possible.	• Preserve and protect existing trees, especially individual trees, stands, and forests of healthy, native or non-invasive species • Transplant or replace existing tree(s) when they are impacted by development and preservation is not feasible • Tree preservation, transplant, and replacement should adhere to the provided herein to prevent a net loss of tree canopy in the development area.	Replacement of individual trees is based on a formula.	a. Tree(s) less than 10-inches in diameter: Replace one tree for every one tree removed (1:1) b. Tree(s) 10-inches in diameter or greater: replacement based on formula c. Forests and Stands of Trees: Plant 1-acre minimum for every 1-acre removed. Consult with federal and local stakeholders to determine the appropriate density, mixture, and size of replacement plantings.	Policies have been updated and adopted on November 5, 2020.
For more information see: https://www.ncpc.gov/docs/publications/Tree_Preservation_and_Replacement_Resource_Guide_2020.pdf					
Prince George's County Woodland and Wildlife Habitat Conservation Ordinance	Conserve and protect trees, woodlands and wildlife habitat by requiring site planning techniques and construction practices.	• Preserve, maintain, enhance, and restore woodlands and wildlife habitat • Establish procedures, standards, and requirements to minimize woodland loss and to protect trees	Replacement based on Forest Conservation Worksheet using the conservation threshold acreage to calculate how many acres of forest must be present on a development site.	a. One-quarter of an acre for each acre cleared on-site above the conservation threshold acreage (ratio of ¼ to 1). b.2 acres for each acre cleared below the conservation threshold acreage (ratio of 2:1).	Policies have not been changed since the 2019 Edition of the Prince George's County Code.
For more information see: https://library.municode.com/md/prince_george's_county/codes/code_of_ordinances?nodeId=THE_CO_CODEPRGECOMA_SUBTITLE_25TRVE_DIV1GE_S25-101DE					
State of Maryland's Forest Conservation Act	Identifies the amount and location of forest to be conserved and of areas to be planted with trees.	• Determine retention and planting acreage	Replacement based on Forest Conservation Worksheet using the conservation threshold acreage to calculate how many acres of forest must be present on a development site.	a. One-quarter of an acre for each acre cleared on-site above the conservation threshold acreage (ratio of ¼ to 1). b.2 acres for each acre cleared below the conservation threshold acreage (ratio of 2:1).	Policies have not been changed since the adoption in 1997.
For more information see: https://www.washco-md.net/wp-content/uploads/StateForestConsv.Tech_.Manual-1.pdf					

Table 1-2: Tree replacement policies comparison

1.8.7 Groundwater & Hydrology

Groundwater on the MRC comes from two principal aquifer systems – the Northern Atlantic Coastal Plain aquifer system and the Piedmont crystalline-rock aquifer (fractured rock region). The Northern Atlantic Coastal Plain aquifer is primarily underlain by semi-consolidated to unconsolidated sediments consisting of silt, clay, and sand and is primarily fed by surface water infiltration. The sediments form a wedge shape, beginning at the Fall Line as a thin layer and becoming thicker closer to the coast. Groundwater in the aquifer is found in pore spaces between sediments and is unconfined near the surface, becoming confined deeper below a clay layer. The Piedmont aquifer is underlain by dense bedrock and is also primarily fed through surface water infiltration. Groundwater occurs in rock fractures under unconfined conditions as defined by the Maryland Geographical Survey (MSG) (MGS, 2021).

Water for nearly all residential and commercial consumers in Prince George's County (including the MRC) is provided by the Washington Suburban Sanitary Commission (WSSC) and is obtained from either the Potomac or Patuxent Rivers (WSSC, 2021 and MDE, 2021). Groundwater is not used for potable purposes at the MRC. Based on the soils present on the site, most groundwater is over 80 inches below the surface around MOD 1 and MOD 2 and the BRF. However, around the stream on the most southern portion of the MRC study area the groundwater is closer to the surface, about 10- 40 inches deep (USDA, 2020). Groundwater intrusion has caused floor damage in the MOD 1 (personal communication, 2021a).

There is one groundwater well that CVM uses solely for animal research purposes. The well is inspected by MDE to assess wastewater. CVM has a state discharge permit (17-DP-3215) and National Pollutant Discharge Elimination System (NPDES) permit (MD3215Q03) for the groundwater well. The outfall location for the well is an unnamed tributary to Beaverdam Creek. FDA is responsible for reporting discharge with when toxic pollutant levels (that are not specifically limited by the permit) exceeding notification levels (MDE, 2020).

1.8.8 Water Resources

The MRC is within the Anacostia River Watershed (MD DNR 8-digit Watershed 02140205) and more specifically within the Upper Beaverdam Creek Watershed (MD DNR 12-digit Watershed 021402050823), which is a Tier II watershed. Three natural stream valleys originate in the north, northwest, and west areas of the campus and run south and west to the low point on Odell Road in the south. These areas are wooded along their banks. Several small natural water bodies are located along the stream valleys, and three large ponds created by former gravel pits occupy the western edge of the campus. Perennial and intermittent streams on the MRC are subject to Prince George's County Stream Valley Buffers (SVBs) and require a 125 feet minimum buffer, which may be expanded up to 150 feet to include steep slopes equal to or greater than 25 percent. A minimum wetland buffer of 25 feet is required for all wetlands. No buildings, structures, impervious surfaces, or activities requiring clearing or grading are permitted within SVBs, except for unavoidable road, trail, or utility crossings.

All the waterways and wetlands are located along the most western boundary of the study area. The locations of the waterways and wetlands identified in the field and their associated buffers are described below and shown in Figure 1-39.

Table 1-3 provides a summary of the streams delineated during field analysis that was conducted in December 2020. Table 1-4 provides a summary of the wetlands delineated in the field.

Stream ID	Name	Classification	Watershed	Length (flagged) (lf)
WUS01	Unnamed tributary	Intermittent	Anacostia River	158
WUS02	Unnamed tributary	Intermittent	Anacostia River	47
WUS03	Unnamed tributary	Intermittent	Anacostia River	115
WUS04	Unnamed tributary	Intermittent	Anacostia River	221
WUS04	Unnamed tributary	Perennial	Anacostia River	704
WUS05	Unnamed tributary	Intermittent	Anacostia River	140

Table 1-3: Waters of the US on the MRC

Wetland ID	Classification	Watershed	Area (flagged) (sf)	Open-ended?
WET1	PFO	Anacostia River	7,441	No
WET2	PFO	Anacostia River	3,292	Yes
WET3	PFO	Anacostia River	16,542	Yes
WET4	POW	Anacostia River	151	Yes
WET5	PFO	Anacostia River	11,707	No
WET6	PFO	Anacostia River	19.360	No
WET7	PFO	Anacostia River	3,393	No
WET8	PFO	Anacostia River	13,523	Yes
WET8	POW	Anacostia River	9,024	Yes
WET9	PFO	Anacostia River	26,096	Yes
WET9	POW	Anacostia River	5,212	Yes
WET9	PEM	Anacostia River	2,476	No
WET10	PFO	Anacostia River	10,027	Yes
WET11	PFO	Anacostia River	2,628	No

Table 1-4: Wetlands on the MRC

[1] Tier II waters are high quality and better than the minimum water quality requirements (MDE, 2021b). As such, these waters are afforded additional protections under Federal and state antidegradation regulations (40 CFR §131.12 and COMAR 26.08.02.04, respectively).

1.8.9 Stormwater

Figure 1-39 shows the number of intermittent streams and the extent of the buffer areas indicated on site as shown in Prince George's County GIS data. There are four existing detention ponds on the MRC that provide stormwater quantity control. One of the ponds is within the study area. The ponds were built prior to MDE stormwater management requirements. The ponds were not built to manage stormwater quality. It is possible that these ponds could be retrofitted to provide some water quality benefit to the site. Within the campus there are building rooftops that are disconnected and discharge stormwater into forested areas, which then provide natural water quality treatment. There are also some roads that sheet-flow directly onto vegetated areas that provide natural water quality treatment. One of the existing stormwater detention ponds is located south of the MOD 2 and is within the study drainage area.

Currently, the MRC consists of less than 10 percent impervious land cover, including buildings, parking lots, and roadways. Therefore, a NPDES Municipal Separate Stormwater System (MS4) permit waiver was granted by MDE and restoration efforts have not been required. Any new development at the MRC would increase the impervious area above the 10 percent requirement. The campus would then become subject to NPDES MS4 permit requirements, including providing water quality treatment for 20 percent of the existing impervious areas around the MRC site, outside the limits of the new development.

Beaverdam Creek is considered an impaired stream and has an USEPA Total Maximum Daily Load (TMDL)[2] for sediment. In 2018, the MRC became subject to NPDES State and Federal Small MS4 Discharge Permit (General Permit) requirements because the campus exceeds the permit's five-acre coverage threshold. The main objective of this permit is to help achieve the Chesapeake Bay TMDL goals established under the authority of the CWA.

Figure 1-39: Bodies of water & stream valley buffers

[2] A TMDL establishes a target for the total load of pollutant the water body can assimilate.

The permit requires the following:
• Public education and outreach,
• Public involvement and participation,
• Illicit discharge detection and elimination,
• Construction site stormwater runoff control (i.e., erosion and sediment control),
• Post-construction runoff control (i.e., stormwater management),
• Pollution prevention and good housekeeping, and
• Development of a baseline impervious area assessment.

County Required Quantity Control
In 2019, Prince George's County issued requirements that 100-year stormwater quantity control for development in the County's 100-year flood control map would be required unless otherwise determined by the Prince George's County DPIE on a case-by-case basis (DPIE, 2019). While the MRC is not located within the 100- and 500-year floodplain as designated by FEMA, it is within the designated stormwater quantity control area on the County's 100-year flood control map. However, any known flooding issues along the Anacostia River and its tributaries are far downstream from the MRC.

1.8.10 Noise

Noise, defined by the U.S. EPA as "any unwanted or disturbing sound," is regulated under the Noise Control Act (NCA) of 1972. The degree of annoyance caused by noise depends primarily upon the amplitude of the sound, its frequency, and its duration. Sound amplitude is quantified in units of decibels (dB). Sound levels that are weighted to account for the non-uniform frequency sensitivity of the human ear are known as A-weighted sound levels and are given in units of A-weighted decibels (dB(A)). Examples of typical construction noise sources and approximate sound levels are given in Table 1-5.

Human ability to perceive change in noise levels varies widely from person to person, as do responses to perceived changes. Generally, a three dB(A) change in noise level would be barely perceptible to most listeners, whereas a ten dB(A) change is typically perceived as a doubling (or halving) of noise levels and is considered a substantial change. These thresholds, summarized in Table 1-6, permit direct estimation of an individual's probable perception of changes in noise levels.

Noise Environment
The nearby land uses that determine the noise environment of the MRC are primarily low- and medium-density residential, interspersed with institutional land uses, parks, and forested area. There is also a large industrial area to the west of the study area. Noise-sensitive land uses surrounding the MRC include residential and recreational areas. Common sources of community noise in the area include airplanes, roadway traffic, sirens from emergency vehicles, and other human and animal activities. Located in a primarily residential area, the loudest and most pervasive source of noise is truck and automobile traffic on freeways and arterial roads. The noise level depends on traffic volumes and speeds. The roadways surrounding the MRC include:
• MD 295/Baltimore-Washington Parkway
• US Route 1
• MD 197/Laurel Bowie Road
• Muirkirk Road
• Odell Road
• Ellington Drive
• Cedarbrook Lane
• Springfield Road

Noise-Sensitive Resources
Existing noise-sensitive resources within the areas that would be affected by the Master Plan include:
• Snowden Woods at Blue Ponds Community to the north of Muirkirk Road
• Montpelier Community to the north of Muirkirk Road
• Snowden Oaks Community to the north of Muirkirk Road
• Woodbridge Crossing Community to the east of Odell Road
• Bedford Community to the east of Odell Road
• Montpelier Hills Community to the east of Odell Road
• Community on Westlock Place

Construction Phase	Noise Level at 50 feet from Source dB(A)
Concrete Saw	90
Drum Mixer	80
Pneumatic Tools	85
Mounted Impact Hammer	90
Slurry Plant	78

Table 1-5: Noise levels associated with outdoor construction

Change in dB(A)	Perception
0	Reference
3	Barely perceptible change
5	Readily perceptible change
10	Twice or half as loud
20	Four times or ¼ as loud
40	Eight times or ⅛ as loud

Table 1-6: Noise thresholds

Figure 1-40: Noise-sensitive areas

MRC
East Parcel
Sensitive Noise Areas
EIS Study Area

0 0.25 0.5 Miles

1. Snowden Woods at Blue Ponds
2. Montpelier
3. Snowden Oaks
4. Woodbridge Crossing
5. Bedford
6. Montpelier Hills
7. Community on Westlock Place
8. Residences on Ellington Dr
9. Residences on Odell Rd
10. Residences on Gross Ln
11. Residences on Old Muirkirk Rd
12. Residences on Orwood Lane
13. Bedford Neighborhood Park
14. Blue Ponds Park
15. Muirkirk West Neighborhood Park
16. Snowden Oaks/Oxwell Park
17. Montpelier Hills Recreational Association
18. Playground by Sea Pearl Ct
19. Montpelier Community Association Recreation Center
20. Montpelier Elementary School
21. Capitol Technology University
22. Queens Chapel United Methodist Church

• Residences on Ellington Drive
• Residences on Odell Road
• Residences on Gross Lane
• Residences on Old Muirkirk Road
• Residences on Orwood Lane
• Bedford Neighborhood Park to the east of Odell Road
• Blue Ponds Park to the east of Old Muirkirk Road
• Muirkirk West Neighborhood Park to the south of Old Muirkirk Road
• Snowden Oaks Community Park/Oxwell Park to the north of Muirkirk Road
• Montpelier Hills Recreational Association to the west of MD 295/Baltimore-Washington Parkway
• Playground to the east of Muirkirk Road at the intersection of Muirkirk Road and Sea Pearl Court
• Montpelier Community Association Recreation Center to the east of Cedarbrook Lane
• Montpelier Elementary School to the north of Muirkirk Road
• Capitol Technology University to the east of Odell Road
• Queens Chapel United Methodist Church to the north of Old Muirkirk Road

1.8.11 Coastal Zone Management

The Coastal Zone Management Act (CZMA) sets out requirements for the management of the nation's coastal resources. The CZMA sets forth the National Coastal Zone Management Program which "aims to balance competing land and water issues through state and territorial coastal management programs" (NOAA, 2021). Section 307 of the CZMA requires that Federal undertaking activities within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone, carry out those activities consistent, to the maximum extent practicable, with the enforceable policies of approved State management programs (16 U.S.C. 1456).

The MRC is located within Maryland's Coastal Zone. Maryland's Coastal Zone extends from three miles into the Atlantic Ocean to the inland boundaries of 16 counties that border the ocean, one of which is Prince George's County, (MDNR, 2021b).

The Maryland Coastal Zone Plan consists of enforceable coastal policies including general policies, coastal resource policies, and coastal use policies. Following is a description of each of the policies applicable to the MRC Master Plan (MDE, 2011).

General Policies

Core Policies – The core policies of the Maryland Coastal Zone Management Plan stress the protection of the health, general welfare, and property of the people of the State. The core policies applicable to the MRC Master Plan include policies for the protection of air resources; elimination of noise hazards; reasonable appropriation of water resources and protection of water resources; the consideration and protection of the natural character and scenic value of rivers and waterways; prevention of soil erosion; and control of hazardous substances.

Water Quality – The State's water quality policies are targeted at protecting the State's water resources by prohibiting and regulating spills and discharges of pollutants which could affect water quality and aquatic organisms.

Flood Hazards – The management program stresses that projects in coastal tidal and non-tidal floodplains, which would create additional flooding upstream or downstream, or that could have an adverse impact upon water quality or other environmental factors, are contrary to State policy.

Coastal Resources

The Chesapeake and Atlantic Coastal Bays Critical Area – In addition to the policies, the laws approved by NOAA for implementing the Chesapeake and Atlantic Coastal Bays Critical Area Protection Program are enforceable policies. The purpose of these polices are to protect wildlife, environmental features (streams, wetlands, buffers), and vegetation from development. There are various Critical Area Commission's (CAC) Chesapeake and Atlantic Coastal Bays Critical Area Protection Program regulations that must be followed if developing in a Critical Area.

Tidal Wetlands – The purpose of the tidal wetlands management program is to protect natural character in, on, or over tidal wetlands, tidal marshes, and tidal waters of Chesapeake Bay and its tributaries, the coastal bays adjacent to Maryland's coastal barrier islands, and the Atlantic Ocean. Any impacts in these areas or to these resources should be appropriately mitigated for impacted.

Non-Tidal Wetlands – The purpose of the non-tidal wetlands management is to protect natural character in, on, or over non-tidal wetlands. Removal, excavation, grading, dredging, discharging of, or filling a non-tidal wetland with materials of any kind, changing existing drainage characteristics, disturbing water levels/table, and destroying plant life is prohibited unless the proposed project has no practicable alternative; adverse impacts are first avoided and minimized; comprehensive watershed management plans are considered; and the proposed project does not cause or contribute to an individual or cumulative effect that degrades aquatic diversity, public welfare, water quality, and recreational values.

Forests –The Forest Conservation Act and the other associated regulations are enforceable policies. Before developing an area larger than 40,000 square feet, any forested and environmentally sensitive areas must be identified and preserved when possible. If preservation is not possible, then reforestation or other mitigation measures are required to replace values associated. This policy does not apply in critical areas.

Historical and Archaeological Sites – The purpose of this program is to protect historical and archaeological sites. Unless permission is granted from Maryland Historical Trust activities, such as excavation, are prohibited.
Living Aquatic Resources – The Living Aquatic Resources program establishes conditions for granting or denying permits to collect or impact aquatic resources. The program is administered by MDNR and MDE.

Coastal Uses

Other polices included in the Maryland's enforceable coastal policies include coastal uses (e.g., mineral extraction, navigation, transportation, sewage treatment, and oil/natural gas facilities).

1.8.12 Waste Management

Waste generated by the MRC includes non-hazardous solid waste, hazardous chemical waste, special medical waste, low-level radioactive and mixed waste, recyclable materials, and animal waste. Chemical waste is packaged and shipped offsite by a qualified contractor using FDA's USEPA generator ID number. Medical waste is handled following procedures outlined by RCRA, Maryland state regulations, and Occupational Safety and Health Administration (OSHA) regulations. All packaging and transportation are performed by the contractor in accordance with DOT requirements. All hazardous waste material, such as batteries and light bulbs, is accumulated near the loading docks of MOD 1 and MOD 2. These hazardous materials are hauled offsite by an approved local hazardous waste hauler. Non-hazardous solid waste is kept onsite in dumpsters before being transported by a waste contractor to a sanitary landfill (Stantec, 2021a). In 2020 FDA disposed of 3.03 tons of municipal solid waste at the MRC (FDA, 2021).

There is a trash compactor and a separate cardboard compactor at the MOD 1 loading dock. These get emptied twice a week and once every two months, respectively (personal communication, 2021d). FDA disposed of approximately 0.9 tons of cardboard at the MRC in 2020 (FDA, 2021). All recyclable materials are separated and placed in a yellow 20-yard container with compartments for plastic bottles, cans, and paper (personal communication, 2021a). Based on the LEED® Recycling Material Identification Report, one-half ton of material is hauled offsite every four days (FDA, 2020). Additional dumpsters for small trash are in the parking lot north of MOD 2 and by the secondary (Odell Road) exit next to the BRF. Disposal of cardboard and waste generated at the MRC gets disposed of at the Olive Street Processing Center, LLC, RecycleOne, or at a sanitary landfill.

Small animal feces from labs and cages are tested for radioactivity and transported by licensed haulers for landfilling or a radioactive treatment/storage facility, as applicable. Large animal feces from pasture areas are mixed with straw/hay and collected by USDA and transported for use at other facilities. All liquid waste goes to one of two pre-treatment rooms in MOD 1 or MOD 2 before discharging to the municipal sewer. The basements in MOD 1 and MOD 2 have sumps to collect groundwater and wastewater from the laboratories. Once the water has been treated, depending on the pH, the water is discharged to the municipal system.

1.8.13 Air Quality

Air quality is regulated at the Federal level through the CAA. The USEPA adopted the CAA in 1970 and its amendments in 1977 and 1990. Pursuant to the CAA, USEPA has established nation-air quality standards to protect public health and welfare. The National Ambient Air Quality Standards (NAAQS) (40 CFR 50) represent the maximum allowable concentrations of selected pollutants in ambient air. NAAQS were developed for six criteria pollutants:

- O_3, nitrogen dioxide (NO_2),
- carbon monoxide (CO),
- particulate matter less than 10 microns in aerodynamic diameter (PM10)
- particulate matter less than 2.5 microns in aerodynamic diameter (PM2.5),
- sulfur dioxide (SO_2), and
- lead (Pb).

NAAQS include the Primary Standards as defined by USEPA for "criteria" air pollutants to protect public health, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly, and the Secondary Standards to protect public welfare including protection against decreased visibility and damage to animals, crops, vegetation, and buildings (EPA, 2019b).

The CAA requires USEPA to classify regions with respect to each criteria pollutant, depending on whether the area's monitored air quality meets the national standards. A region that is meeting the air quality standard for a given pollutant is designated as being in "attainment" for that pollutant. If the region does not meet the air quality standard, it is designated as being in "nonattainment" for that pollutant. Ozone nonattainment areas are categorized based on the severity of pollution: marginal, moderate, serious, severe, or extreme. An area that was designated as nonattainment and has been re-designated to attainment and has a Federally approved maintenance plan is in "maintenance" for that pollutant. Areas may be designated as attainment for some standards and nonattainment or maintenance for others (40 CFR 93.125).

The Washington DC-MD-VA Region, which includes the MRC, is designated as a marginal nonattainment area for O_3 (area has a design value of 0.071 ppm up to, but not including 0.081 ppm) under the 2015 8-hour standard by the Metropolitan Washington Council of Governments (MWCOG) in 2020.The Washington DC-MD-VA region is designated as in attainment of the NAAQS for all other criteria pollutants. In 2019, the region was redesignated by the USEPA regarding the 2008 8-hr ozone standard from marginal nonattainment to attainment maintenance (EPA, 2021). While the area still has ozone issues, precursor emissions such as volatile organic compounds, nitrogen oxides and particulate matter are reducing, therefore ozone concentrations are slowly declining. The District's Ambient Air Quality Trends Reports illustrates these trends by the District Department of Energy & Environment (DOEE) in 2020.

1.8.14 Greenhouse Gases & Climate Change

Greenhouse Gas (GHG) emissions released from human activities are widely recognized as a contributing factor to climate change. While the economic sectors primarily responsible for the most manmade GHG emissions in the U.S. in 2017 were transportation (29 percent), electricity production (28 percent), and industry (22 percent), according to the USEPA, new commercial and residential developments also contribute to GHG emissions (EPA, 2019c).

USEPA's authority to regulate GHG emissions stems from the U.S. Supreme Court decision in Massachusetts v. USEPA (2007). The U.S. Supreme Court ruled that GHG meet the definition of air pollutants under the existing CAA and must be regulated if these gases could be reasonably anticipated to endanger public health or welfare. On December 7, 2009, USEPA signed the Final Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the CAA. The endangerment finding states that current and projected concentrations of the six key GHG in the atmosphere (carbon dioxide, methane, nitrous oxide, hydrochlorofluorocarbons, chlorofluorocarbons, sulfur hexafluoride) could threaten the public health and welfare of current and future generations. Furthermore, USEPA found that GHG from motor vehicles contribute to the GHG concentrations that threaten public health and welfare.

On June 26, 2019, CEQ published *Draft National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions in the Federal Register* (84 FR 30097), and the public comment period ended on August 26, 2019. The draft guidance discusses how NEPA analysis and documentation should address GHG emissions. If finalized, the guidance would replace the final guidance CEQ issued on August 1, 2016, entitled *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews*, which was withdrawn on April 5, 2017.

The State of Maryland passed the Greenhouse Gas Emission Reduction Act in 2009. The regulation, administered by the MDE, required the state to develop and implement a plan to reduce GHG emissions by 2020 to a point that is 25 percent below 2006 emissions. The plan, released in 2012 and updated in 2015, encouraged reductions in GHG emissions through a variety of incentive programs targeting the public and private sector. These programs focused on increasing energy efficiency using existing technologies, identifying ways to transition to new energy sources, and stimulating further technological development to reduce GHG emissions. In 2020, Governor Hogan reauthorized the Greenhouse Gas Emissions Reduction Act, requiring Maryland to reduce GHG emissions by 40 percent from the 2006 baseline by 2030 and to achieve net-zero statewide greenhouse gas emissions by 2045.

MDE published an inventory of GHG emissions in the State of Maryland for the year 2017, which stated that Maryland activities accounted for approximately 79.12 million metric tons (MMT) of gross carbon dioxide equivalent (CO_2e) emissions, with net emissions of approximately 67.40 $MMTCO_2e$ once carbon sinks such as forest lands and agricultural soils were considered (MDE, 2017). This resulted in 26.21 percent reduction in the total gross GHG emissions in 2006. The three principal sources of GHG emissions in Maryland are electricity consumption; transportation; and residential, commercial, and industrial fossil fuel use, which account for 31 percent, 40 percent, and 18 percent of Maryland's 2017 gross emissions, respectively (MDE, 2017).

GHG reduction is one of GSA's ten sustainability goals. For GSA-owned buildings, GSA requires high-performance building design through compliance with the Guiding Principles for Sustainable Federal Buildings for all new construction through its Facilities Standards for the Public Buildings Service (P-100). GSA's sustainability plan focuses on improving building energy efficiency and installing advanced and renewable energy technologies. One of its major energy strategies requires all new construction to use 30 percent less energy than what the American National Standards Institute requires and to be LEED® Gold certified. GSA has also worked to reduce GHG emissions resulting from employee business travel, commuting, electrical transmission and distribution, and waste-related emissions, including from solid waste and wastewater management. GSA exceeded its goal of a 40-percent reduction of GHG emissions by the end of 2013 and seeks to reduce GHG emissions by 73 percent from 2008 levels by 2025 (GSA, 2019).

FDA is a component under the U.S. Department of Health and Human Services (USHHS). USHHS incorporates sustainability into its daily operations at campuses and facilities. From FY 2008 to FY 2019, USHHS saw a 29.4 percent reduction in GHG emissions. In FY 2019 FDA had a decrease in energy use. Facility energy efficiency is accomplished through energy reduction projects, renovation and upgrade projects, and new construction. Onsite energy technologies are included in new design projects to the extent practicable and improving water efficiency through infrastructure upgrades, lead detection and prevention, metering, and implementing no-cost or low-cost water conservation measures. In addition, all new construction uses the 2016 Guiding Principles and Leadership in Energy and Environmental Design standards. Lastly, HHS maximizes its efforts in waste management and diversion by encouraging staff and contractors to reduce waster generation, increase recycling, and reinforce the use, handling, and disposal of hazardous materials (HHS, 2020).

In FY 2020, FDA began upgrading the MRC domestic water pipe insulation, heating, ventilation, and air conditioning (HVAC) pumps, and air handling units (AHU). This has created an annual energy savings of 993,787 kilowatt-hours (kWh), 16,566 therms, and $95,567. In addition, at MOD 1, two AHUs are being replaced with higher efficiency models, which equates to an estimated energy and water savings of 86,909 KWh, 69,600 gallons of water and $21,573 annually. Other energy conservation measures planned for the MRC include other AHU replacements; controls, cooling tower, boiler, pump systems, and valve improvements; lighting and controls retrofits; exterior window and joints caulking and repairs; and a solar PV system installation. Additional MRC energy savings projects under design in FY 2020 include building vestibule upgrades, HVAC upgrades, LED lighting retrofit, and ventilation improvements (HHS, 2020).

1.9 Historic Resources

Previous historic and archaeological surveys of the MRC determined there were no resources eligible for listing in the NRHP. A DOE for the MRC and East Parcel was submitted to the MHT on February 4, 2021. On March 4, 2021, MHT concurred with the findings of this DOE that the MRC and East Parcel are not eligible for the National Register of Historic Places under Criteria A, B, or C.

A Phase I Archaeological Survey for the MRC and East Parcel was submitted to MHT on January 27, 2021. The survey identified one newly inventoried site, 18PR1198, on the East Parcel which consists of a moderate scatter of precontact lithics and three artifacts indicating recurring short term use of the site by people from approximately 6,200 to 2,500 years ago. The East Parcel is not part of the proposed development associated with this Master Plan. The survey report recommended that Phase II archaeological investigations be carried out to evaluate the site's eligibility for the NRHP if it is identified for disturbance in the future. MHT concurred with the findings of the Phase I Archaeological Survey on March 4, 2021. At the request of MHT, permanent plans to store and curate the artifacts will be part of the project development.

Based on the MHT's concurrence with the DOE and the findings of the Phase I Archaeological Survey, GSA has determined that there are no historic resources that will be impacted by the Master Plan alternatives.

See Chapter 4, subchapter 4.1.2 and 4.1.3 for information on the NHPA compliance process for the Master Plan.

Figure 1-41: BRF Rendering from Architectural Forum, January 1963

1.10 Utility Infrastructure

1.10.1 Domestic Water

WSSC provides potable water to the MRC. According to the 1994 design plans for the MOD 2 site, there is an existing 10-inch water line connecting to the 16-inch WSSC water main in Muirkirk Road[3] (see Figure 1-42). This 10-inch line runs along Pasture Road, past MOD 1 and MOD 2, and then down to the South Loop Road at the Animal Research Facility. The 10-inch line, and smaller branches off this line, provide service to the buildings and other facilities in that area, including down to the Animal Waste Area (located south of the loop road, near Odell Road). A well is located near Building H that appears to only serve the building. Building H also gets water from the 10-inch water line. A 3-inch branch off the 10-inch water line runs east along Service Road to Pasture D to serve the pasture area.

In a Letter of Findings (LOF) to GSA, WSSC stated that a new water service connection to serve the new development at the MRC site could be provided from the existing 16-inch WSSC water main running along Muirkirk Road, north of the site (WSSC, 2017). Portions of this pipe are made of cast iron and it is preferred that a new site water connection be made with ductile iron pipe (DIP). The existing pipe west of the main site entrance on Muirkirk Road is ductile iron, so a new water connection should be in that area.

There is also an existing 24-inch WSSC water main line running along Odell Road. The BRF gets water from a 6-inch connection to this 24-inch line.

1.10.2 Sanitary Sewer

WSSC provides sanitary sewer service to the MRC. Sewer service is provided to all the buildings by gravity lines that flow down to pumping stations (see Figure 1-42). There is a pump station located in the Animal Research Facility area, one near the Animal Quarantine Building, and one in the BRF area.
A gravity sewer line takes flows from MOD 2 and

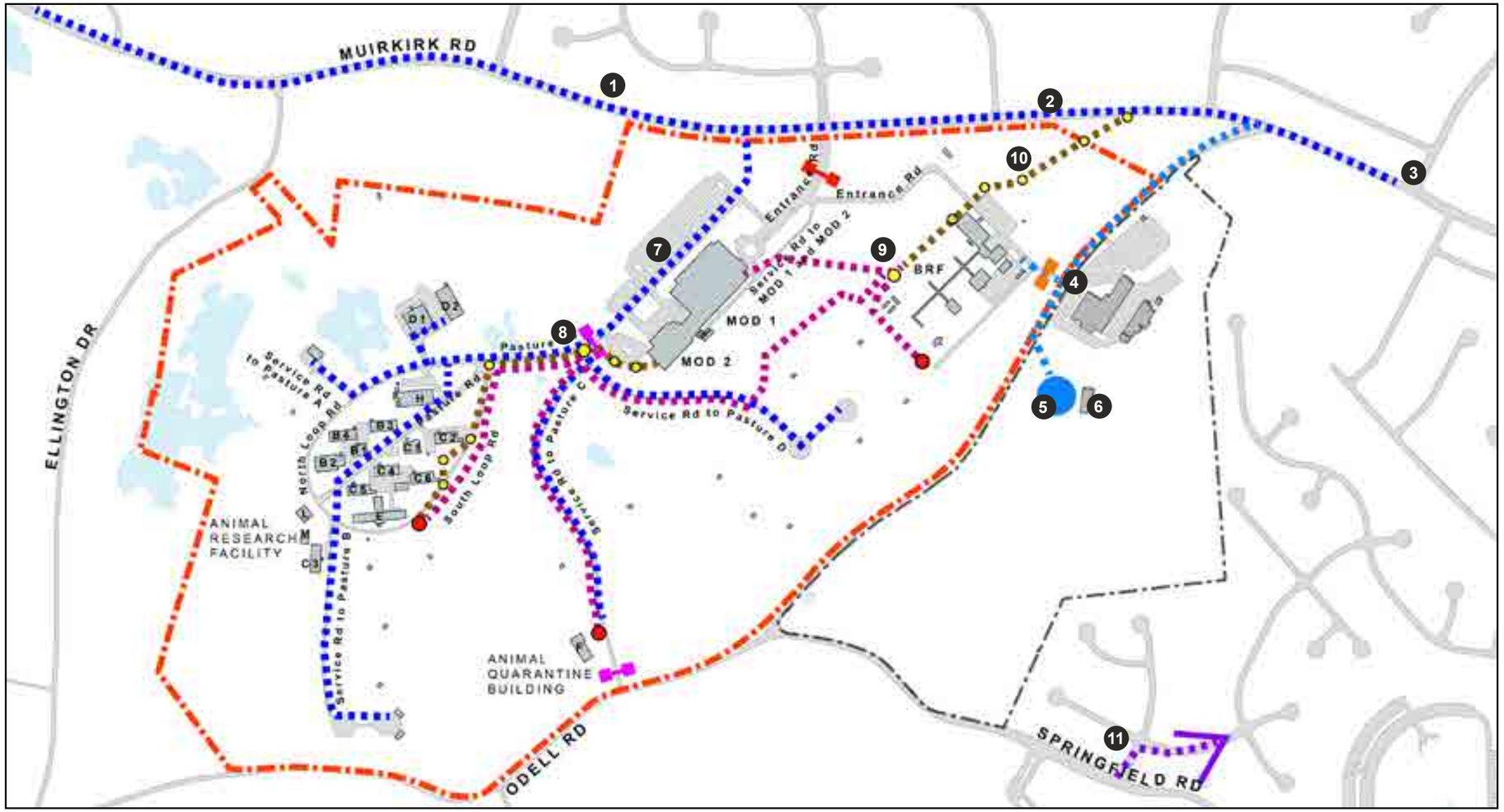


Figure 1-42: Water & sewer infrastructure

MRC Boundary
East Parcel
Existing Water Line
Existing Water Line (Odell Rd)
Sanitary Force Main
Sanitary Gravity Main
Existing Public Sewer
Pump Station
Manhole
Existing WSSC Water Tank
Primary Access
Secondary Access (Closed)
Restricted Access
0 150 300 600 Feet

Existing Water

1. Existing 16" WSSC Water Main
2. Existing 16" WSSC Water Main
3. Existing 20" WSSC Water Main
4. Existing 24" Water line (Odell Rd)
5. Existing WSSC Water Tank
6. Existing WSSC South Laurel Pumping Station
7. Existing On-Site Water Lines (TYP)

Existing Sewer

8. Sewer Force Main Line from Animal Quarantine Building connects into the Gravity Line at the Manhole
9. Three Force Main Lines connect into the Manhole
10. Existing Gravity Line to Muirkirk Road
11. Existing 8" Public Sewer at Lighthouse Drive

[3] Information received from WSSC did not confirm this water connection point.

runs down to a sewer pump station near Building E in the Animal Research Facility area. This, and other sewer flow from the Animal Research Facility area, is pumped through a force main pipe which travels back up towards MOD 2, then eastward along the pasture service road, and then to the northeast to the BRF area, where it connects to a manhole on a gravity sewer line. This gravity sewer line runs to the northeast and out to Muirkirk Road (WSSC 8301 MOD 1 and 8501 BRF). There are two other force main pipes that discharge into this same manhole. One line comes from a pump station on the BRF site, and the other comes from MOD 1. There is also a holding tank serving the Animal Waste Area in the Animal Research Facility area.

MOD 1 pretreats some of its wastewater; all drains from the laboratories are piped to an acid neutralization tank, monitored for acidity or alkalinity, and neutralized prior to being ejected to the WSSC sewer connection. Wastewater from cage, rack, and bottle washing is collected separately from other sanitary waste and is automatically monitored for pH and neutralized prior to being released to the WSSC sewer connection (GSA, 1995). MOD 2 has a pH treatment station on the ground floor that treats all Lab waste, autoclaves, and bottle washers (FDA 2021).

WSSC confirmed that an existing WSSC 8-inch public sanitary sewer line is sufficient to provide service needed to implement the Master Plan. This sewer line is located southeast of the MRC, at the intersection of Springfield Road and Lighthouse Drive and is part of the Parkway Sewer Watershed.

1.10.3 Campus Electrical Power, Gas and Telecom

Electrical power on the MRC is provided by Potomac Electric Power Company (PEPCO). There are existing power poles running down both sides of Muirkirk Road and on the west side of Odell Road. Two pole lines enter the MRC site between Pasture Road and Westlock Place and run to a substation. There are two electric feeders that run from the substation to the BRF and to MOD 1 and MOD 2. One of the feeders from the substation to MOD 1 was replaced January of 2021. The current plan is to replace the second feeder and the substation by the end of 2021. This existing underground electric and telecom duct bank runs along the south side of MOD 1 and MOD 2 and then down along Pasture Road to the Animal Research Facility. The duct bank branches out and provides electric and telecom service to the buildings and other facilities in that area, including the Animal Waste Area and the pasture areas, through underground and overhead lines.

Natural Gas on the MRC is provided by Washington Gas. There is an existing high pressure main line adjacent to Muirkirk Road. Gas service enters along the main entrance road and then runs down to the BRF area. Gas service lines also come off of Odell road to service Building F as well as the BRF area.

There is an existing system of underground hot and chilled water lines serving the buildings in the Animal Research area.

1.11 Design Considerations

The combined site analysis identifies the following site-specific considerations:

- consider the most suitable areas or development, which are MOD 1 and MOD 2 and the BRF,
- maintain the Muirkirk Road entrance as the main access for staff and visitors into MRC,
- create an additional entrance into the MRC for delivery and service vehicles,
- expand the existing internal road system to allow for shuttle drop off/pick up,
- create a pedestrian connections between buildings and a walkable campus,
- meet the parking needs with structured parking at a walkable distance from workplaces,
- preserve the stream valley in-between MOD 1 and MOD 2 and the BRF as a central landscape feature,
- preserve the slope between the BRF and pasture to the south as a natural landscape buffer between facility and pastures, and
- consider the exposure to sun for building orientation to meet sustainability goals.

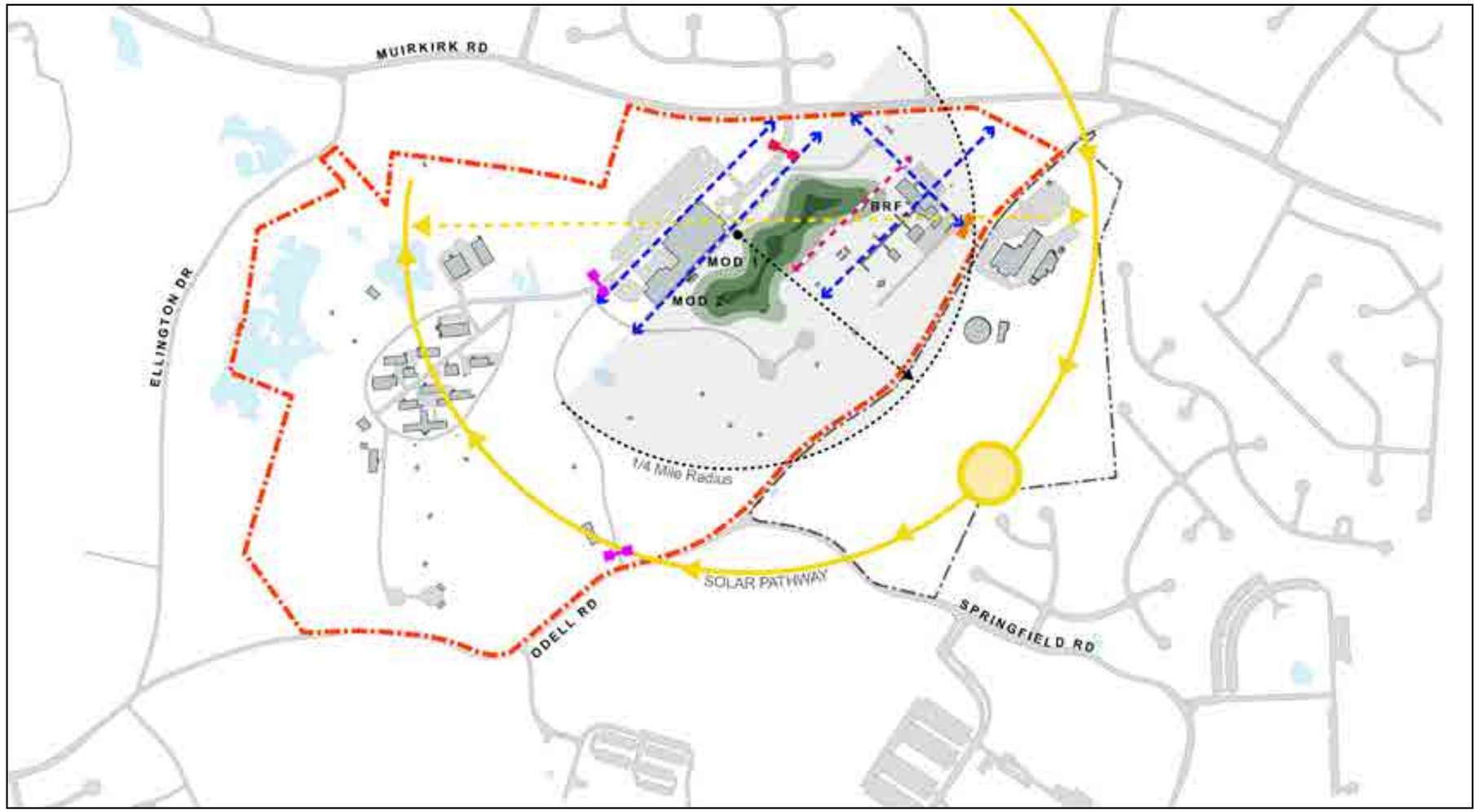


Figure 1-43: Design considerations

2

OUTREACH & COORDINATION

2.OUTREACH & COORDINATION

2.1 Public Engagement

2.1.1 Introduction and Identified Issues

GSA and FDA gave an informational presentation to NCPC on February 4, 2021. This was a virtual meeting, live-streamed and open to the public. NCPC posted the presentation materials and video recording of the meeting on its website. GSA and FDA met with Consulting Parties, as required by the NHPA, Section 106. Two information meetings were held, on March 24 and April 29, 2021. These were virtual meetings that have been recorded and the presentation files (PDFs) have been posted on the websites of GSA and FDA.

Key issues identified through scoping and meetings with the public and agencies include:

- Impact of more traffic on already congested roadways
- Development on the East Parcel
- Viewshed from residential communities
- Preservation of trees and other natural features
- Stormwater management features
- Sustainable design features (green roofs, solar panels, permeable pavement)

The Design Team has worked closely with GSA and FDA to develop the Action Alternatives and the agencies have reviewed the draft plan documents. In coordination with GSA and FDA, the following preliminary conditions for future growth at the MRC were identified:

- encourage employees to use alternative means of transportation
- maintain the 100- 300-foot landscape buffer at perimeter of the site
- minimize impacts to vegetation and wildlife by maintaining areas of forest as much as possible
- support the conservation of the natural resources and careful configuration of new features
- ensure the Upper Beaverdam Creek Watershed will not be impacted by the Action Alternatives

2.1.2 Public Review

GSA issued a Notice of Intent (NOI) to prepare an EIS on December 22, 2020. The NOI was published in the Federal Register, The Washington Post, and the Prince George's Post. NOI letters were mailed to approximately 125 federal, state, and local agencies, public officials, community groups, special interest groups, and area residents. The letters included information on public scoping and asked for the public's comments on the proposed MRC Master Plan. The public scoping period was held from January 4 to February 11, 2021. Due to the COVID-19 pandemic, in lieu of an in-person public scoping meeting, GSA conducted scoping through virtual public scoping; directed mail correspondence to potentially interested persons, agencies, and organizations; and met (virtually) with agencies having an interest in the Master Plan. A prerecorded virtual public scoping presentation was available on GSA's website throughout the duration of the scoping period. A project phone line was also available for the duration of the scoping period so that persons unable to view the presentation online could listen to the presentation and leave comments on the proposed MRC Master Plan. GSA and FDA also met (virtually) with NCPC, M-NCPPC, Prince George's County government, Maryland Department of Transportation State Highway Administration (MDOT SHA) to solicit input on the proposed project.

2.2 Coordination with Other Jurisdictions

Federal, state, and local agencies have been consulted throughout the development of the Action Alternatives. GSA and FDA have held informational briefings for NCPC and Prince George's County staff and presented the preliminary alternatives to NCPC for information purposes only.

Through the State Clearinghouse, coordination has also taken place with:

- USFWS
- MDNR
- MDE
- MDOT
- MHT
- MDOT SHA
- Prince George's County Department of Public Works and Transportation
- Prince George's County Department of Economic Corporation
- Prince George's County Department of General Services
- Washington Metropolitan Area Transportation Authority (WMATA)
- Major Property Owners, including Neighborhood and Homeowners Associations

For an overview of the major property owners, see also subchapter 1.6.7.

See Chapter 4 for details regarding the environmental and historic preservation impact of the proposed new development.

3

MASTER PLAN DEVELOPMENT

3.MASTER PLAN DEVELOPMENT

3.1 Land Use Feasibility Study

In 2018 a LUFS was completed. To demonstrate the feasibility of additional program on the campus, a series of land development strategies and scenarios were tested. The LUFS took site constraints in consideration, including stream valleys and steep slopes. Despite these site constraints the LUFS concluded that significant development was possible while maintaining current operations. It should be noted that the infrastructure capacity of the surrounding area, in terms of both traffic and utilities were not extensively studied at the time.

The 2018 LUFS assumed the following as guiding principles:
1. consolidate new program to minimize impact on operations,
2. maintain a setback from the perimeter,
3. consider additional access to support new program,
4. develop a parking strategy to address growth, and
5. take an incremental approach to growth.

The 2018 LUFS identified the northeast portion of the campus as most suitable for the first phase of future development. This was the starting point for all strategies with later phases of development fanning out to the south and east of the site, including the undeveloped area of the East Parcel.

As part of the 2018 LUFS, three fundamental land use strategies were studied. The preliminary site analysis demonstrated that there is sufficient land available for development. The three strategies assumed a low, medium, and high level of density on the site.

Strategy 1:
Low intensity of new build

Figure 3-1: LUFS Low intensity of new build

• Develop a single new office building to be located in the northeast corner of the site.

• Utilize former kennel grounds for new surface parking lot

• Maintain existing BRF building

• Preserve existing pasture lands

• Provide space for 550 employees

Strategy 2:
Medium intensity of new build

Figure 3-2: LUFS Medium intensity of new build

• Develop two new office buildings to be located in the northeast corner of the site.

• Utilize former kennel grounds for expanded new surface parking lot

• Remove existing BRF buildings, with program to be relocated within new office buildings

• Preserve existing pasture lands

• Provide space for 1,100 employees

Strategy 3:
High intensity of new build

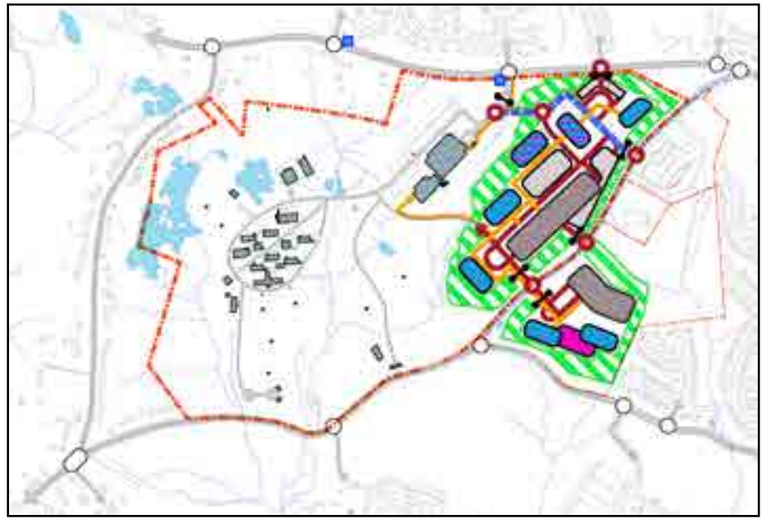


Figure 3-3: LUFS High intensity of new build

• Develop multiple office buildings supported with new parking structures

• Utilize former kennel grounds for new surface parking lot

• Remove existing BRF buildings, with program to be relocated within new office buildings

• Utilize Pasture D for new development

• Utilize land in East Parcel, east of Odell Road for new development

• Provide space ranging from 1650 employees up to 3850 employees in maximum scenario

3.2 Potential Development Areas

At the start of the master planning in the fall of 2020, the 2018 LUFS was updated based on a more in-depth site analysis. A closer look at the site revealed that building on the undeveloped area of the East Parcel and the southern portion of the campus was not feasible.

The main reason for precluding the undeveloped area of the East Parcel from further consideration is that the development on this parcel would have significant adverse environmental impacts. The undeveloped area of the East Parcel is covered with trees. Federal, state and county tree replacement policies require that any tree removed for development, will need to be replaced elsewhere on FDA-owned land. Given the extensive nature of the woodlands on the East Parcel, it would be a challenge to meet this requirement within the plan area without impacting the current uses on the campus. Another reason to exclude the East Parcel, is that the East Parcel is cut off from the main campus by Odell Road and that it would be a challenge to provide safe and convenient pedestrian connections between the main campus and the East Parcel. Lastly, the more in-depth site analysis has revealed that the program needed to accommodate up to 1,800 employees can fit easily on the main campus. Therefore, at this time, there is no need to consider the undeveloped area of the East Parcel for new development.

The 2018 LUFS also considered the most northern pasture area, Pasture D, for development. However, this area is part of the Animal Research Facility for which FDA has strict bio security requirements. Access to this area is restricted. FDA has identified an ongoing need for the pasture area to support the operations of CVM on the MRC. Therefore, this area is no longer considered a potential development area.

As a result, the master plan only considers two sites for future development:

MOD 1 and MOD 2 Site
Total: 12.48 acres
Buildable: 4.53 acres
Parking: 280 spaces

Characteristics: Two existing buildings of 4 and 6 stories tall. A large surface parking lot. Predominantly open and flat landscape, except for the steep slope to the east and south of MOD 1 and MOD 2.

BRF Site
Total: 18.91 acres
Buildable: 18.91 acres (includes 10.27 acres of BRF and 8.64 acres surrounding area)
Parking: 40 spaces

Characteristics: Multiple smaller, detached one-story buildings. One main building with offices. Three amenity buildings, one of them is temporary. A small surface parking lot. An open and flat landscape.

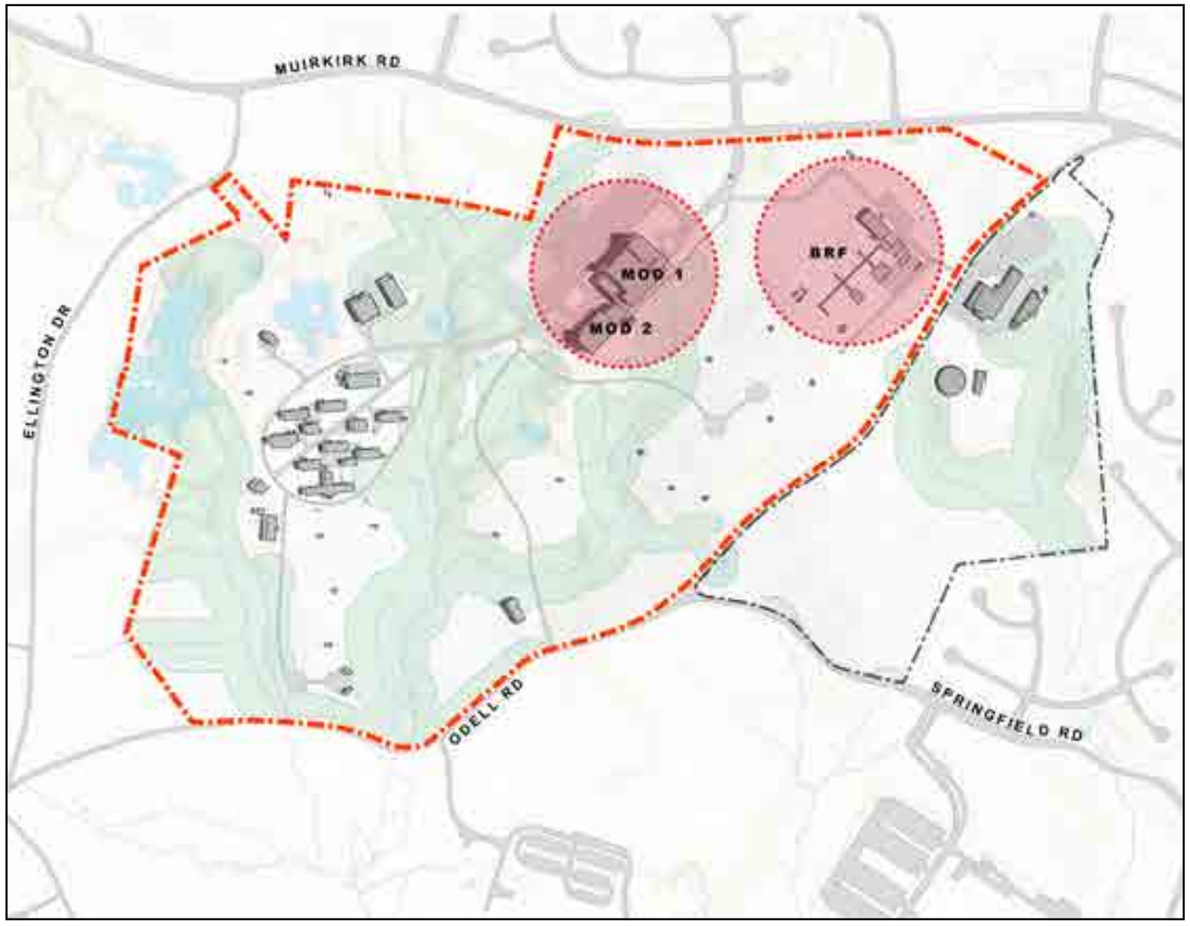


Figure 3-4: Potential Development Areas

3.3 Master Plan Alternatives

The Master Plan includes a No-Action Alternative and three Action Alternatives A, B and C.

3.3.1 No-Action Alternative

Under the No-Action Alternative, FDA would continue its current operations at the MRC. The number of employees and support staff would not increase and would remain at approximately 300.

Any additional FDA employees would need to be housed in other government-owned or leased space in the Washington, DC metropolitan area. Locating these employees outside the MRC would result in inefficiencies in coordination of work products and in use of administrative, management, and technical support functions.

At present, the MRC is home to:
• 300 personnel assigned to FDA (specifically CFSAN and CVM),
• approximately 480,000 gsf laboratory and office space,
• 32 acres of pastures, and
• 320 parking spaces for employees and visitors (all surface parking).

It should be noted that there is no dedicated visitor parking on the campus.

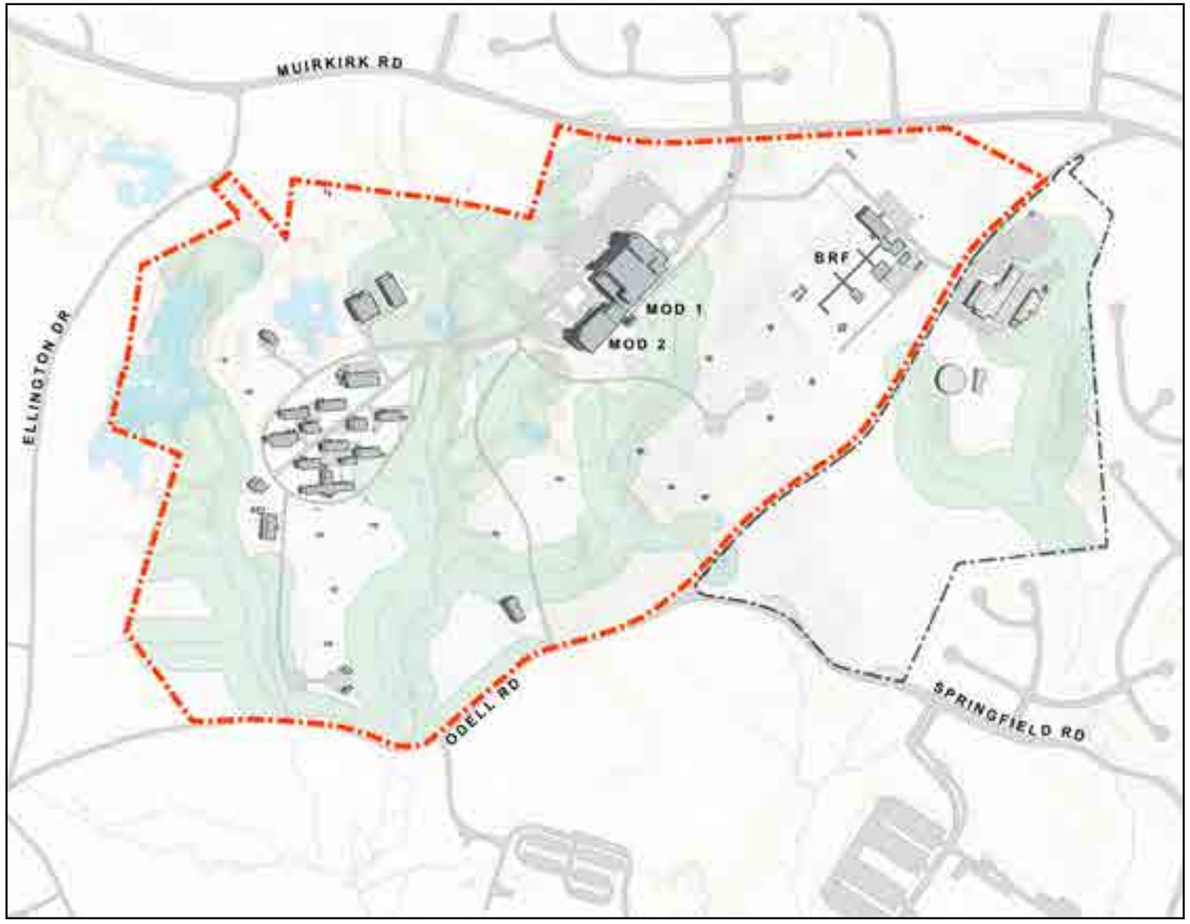


Figure 3-5: No-Action Alternative

NO-ACTION ALTERNATIVE

Aerial View Looking North

Figure 3-6: No-Action Alternative aerial view

3.3.2 Action Alternatives

The three Action Alternatives assume that new development is:
- concentrated on the northern portion of the campus,
- organized around a central open space amenity,
- connected by pedestrian paths and boardwalks between existing and new buildings, and
- excluded from areas that are needed for current operations on the site, specifically related to animal research.

The Action Alternatives take a distinctly different approach to the distribution of new development on the site:
- Alternative A concentrates the development at the MOD 1 and MOD 2 site and is referred to as the Compact Campus,
- Alternative B distributes the development between the MOD 1 and MOD 2 site and the BRF site and is referred to as the Dual Campus, and
- Alternative C concentrates the development on the BRF site and is referred to as the Northeast Campus.

The No-Action and Action Alternatives have been studied to ensure compliance with NEPA and NHPA.

Master Plan Alternatives Summary

The Master Plan assumes approximately 438,000 gsf of new office space, including special use space to accommodate a total of up to 1,800 employees at the MRC.

The Master Plan assumes a 1:2 parking ratio, which equals 900 parking spaces for employees. In addition to employee parking, the Master Plan assumes 80 parking spaces for visitors.

The proposed development is expected to be implemented in two phases assuming a 20-year plan horizon. Phase 1 will be implemented in 5-6 years, and Phase 2 in 7-20 years.

The proposed program of uses, broken down by phase, is summarized in Table 3-1.

Program / People	Phase 1 (5-6 year)	Phases 2 (7-20 years)	Total
Additional Office	175,000 gsf	200,000 gsf	375,000 gsf
Additional Special Use	63,000 gsf	0 gsf	63,000 gsf
Additional Population	700 people	800 people	1,500 people
Total Employee Parking	500 spaces	400 spaces	900 spaces
Total Visitor Parking	80 spaces	0 spaces	80 spaces

Table 3-1: Program Summary

Alternative A: Compact Campus; Integrating old and new

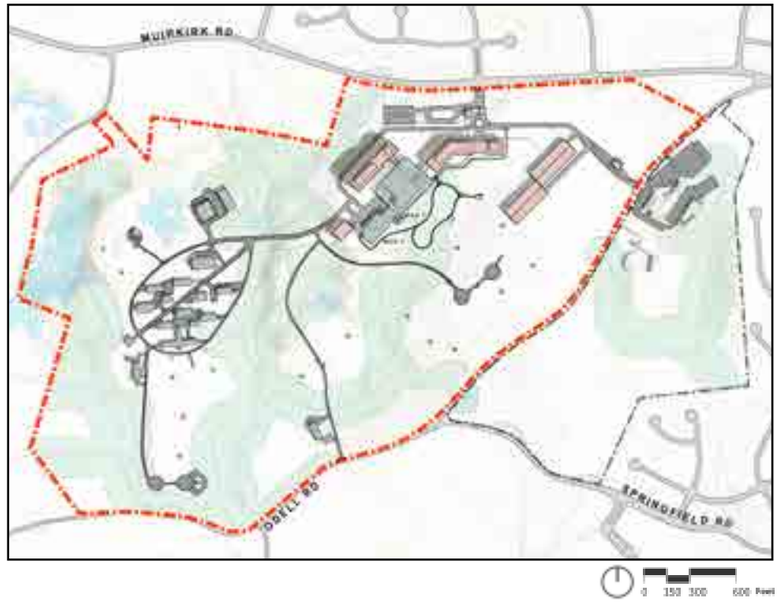


Figure 3-7: Alternative A: Compact campus; Integrating old and new

- Concentrates new office development at MOD 1 and MOD 2
- Locates all new parking at the BRF in two garages
- Is most disruptive during construction
- Adds the least impervious surfaces
- Requires least new roadways

Alternative B: Dual Campus; Distributing development between two sites

Figure 3-8: Alternative B: Dual campus; Distributing development between two sites

- Splits new office development between MOD 1 and MOD 2 and the BRF
- Locates one new parking garage at MOD 1 and MOD 2 and one at the BRF
- Causes moderate disruption during construction
- Adds most impervious surfaces
- Requires more new roadways than Alternative A but less than C

Alternative C: Northeast Campus; Reimagining the BRF

Figure 3-9: Alternative C: Northeast campus; Reimagining the BRF

- Concentrates new office development at the BRF
- Locates all new parking at the BRF in one garage
- Is least disruptive during construction
- Adds more impervious surfaces than A but less than B
- Requires most new roadways

Commonalities

- Proposes 438,000 gsf for Office and Special Use Space
- Projects population of up to 1800 employees
- Assumes Parking Ratio: 1:2. Proposes a total of 980 parking spaces
- Maintains 100-foot buffer of vegetation along perimeter and 300-foot buffer along western boundary
- Treats stream valley between MOD 1 and MOD 2 and the BRF as central design element
- Adds one new entry gate at Odell Road
- Assumes existing back road for emergency/special access.
- Integrates significant stormwater management features
- Maintains tree cover and minimizes environmental disturbances

**New parking includes replacement of existing parking displaced by new buildings*

3.4 ALTERNATIVE A

COMPACT CAMPUS; INTEGRATING OLD AND NEW

In Alternative A new buildings are placed to the north and west of the MOD 1 and MOD 2. The building heights stay within the range of MOD 1. The scheme emphasizes connectivity and walkability of the campus. The new buildings directly west and north of MOD 1 are connected to the existing building complex by elevated walkways. The new building north of MOD 1 is visible from the main entrance at Muirkirk Road. However, most of the building volume will be screened by forested areas that form the perimeter landscape buffer. A strategically positioned atrium will allow for a view from the main entry, through the new building, into the forested stream valley at the center of the campus.

New buildings are positioned directly adjacent to MOD 1 and MOD 2.

Alternative A includes the following:
- Two new office buildings up to 5 and 6 stories tall adjacent to MOD 1 and MOD 2
- The new building west of MOD 1 will replace the existing surface parking lot
- Two new parking garages located at the BRF site
- A pedestrian bridge between MOD 1 and the new building to the north
- A programmable skybridge between the new buildings connecting the BRF site
- Space for shared amenities such as conference center, cafeteria, and fitness center in the podium of the first new office building to be built

TOTAL NEW BUILDING AREA : 438,000 sf
(OFFICE AND SPECIAL SPACES ONLY)

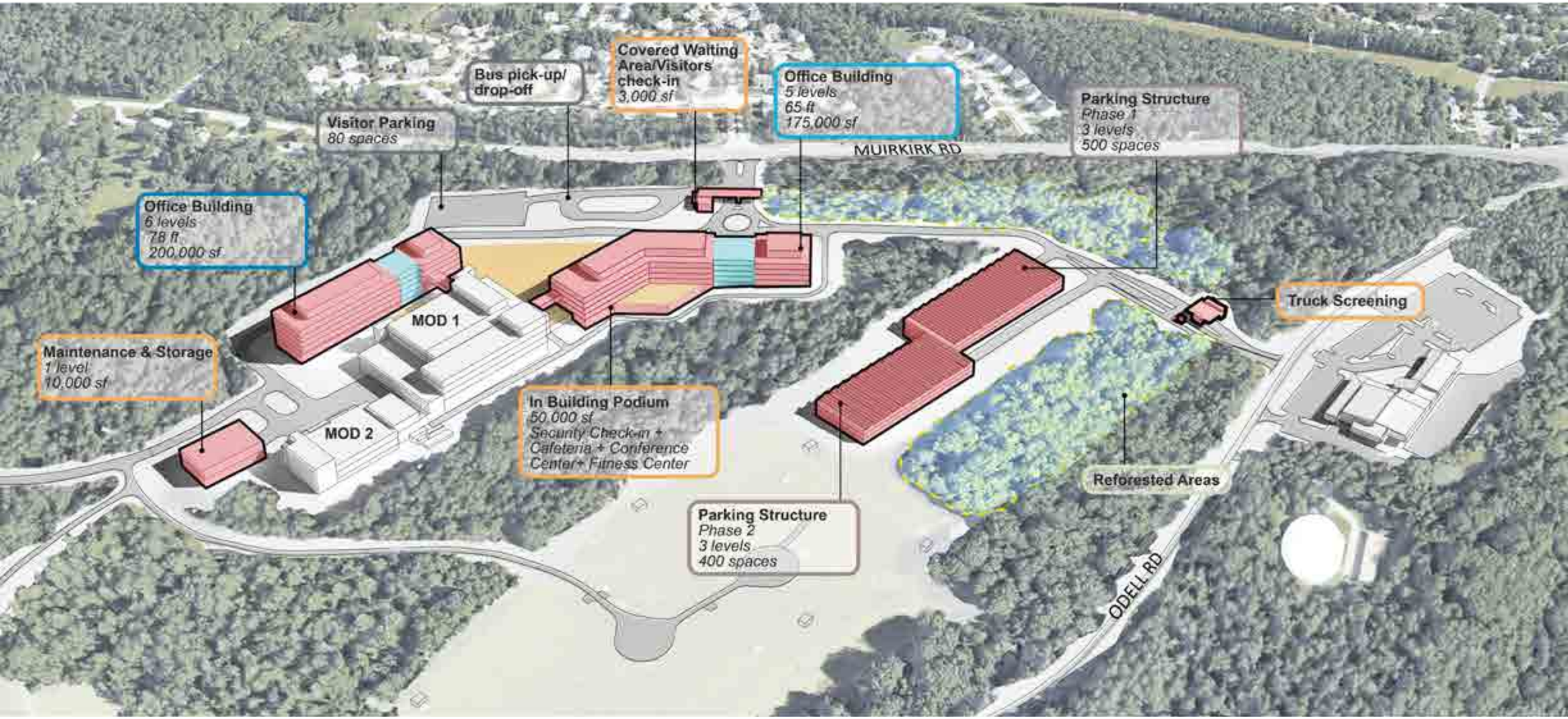
- **TOTAL OFFICE : 375,000 sf**
- **TOTAL SPECIAL USE AND SHARED USE : 63,000 sf**
  - Visitor Check In - 3,000 sf
  - Security Screening - 8,000 sf
  - Cafeteria - 10,000 sf
  - Conference Space - 16,000 sf
  - Fitness Center - 16,000 sf
  - Maintenance and Storage - 10,000 sf

TOTAL NEW PARKING : 980 Spaces
(New parking includes replacement of existing parking displaced by new buildings, and assumes parking at 1 space per 2 employees)

Table 3-2: Alternative A tabulations

Alternative A: Compact Campus; Integrating old and new

Aerial View Looking North



TOTAL NEW BUILDING AREA: 438,000 sf | TOTAL NEW PARKING : 980 Spaces

(New parking includes replacement of existing parking displaced by new buildings, and assumes parking at 1 space per 2 Employees)

Figure 3-10: Alternative A aerial view

Alternative A: Compact Campus; Integrating old and new

Concept Diagram

1. Natural landscape amenity space
2. Central campus landscape space

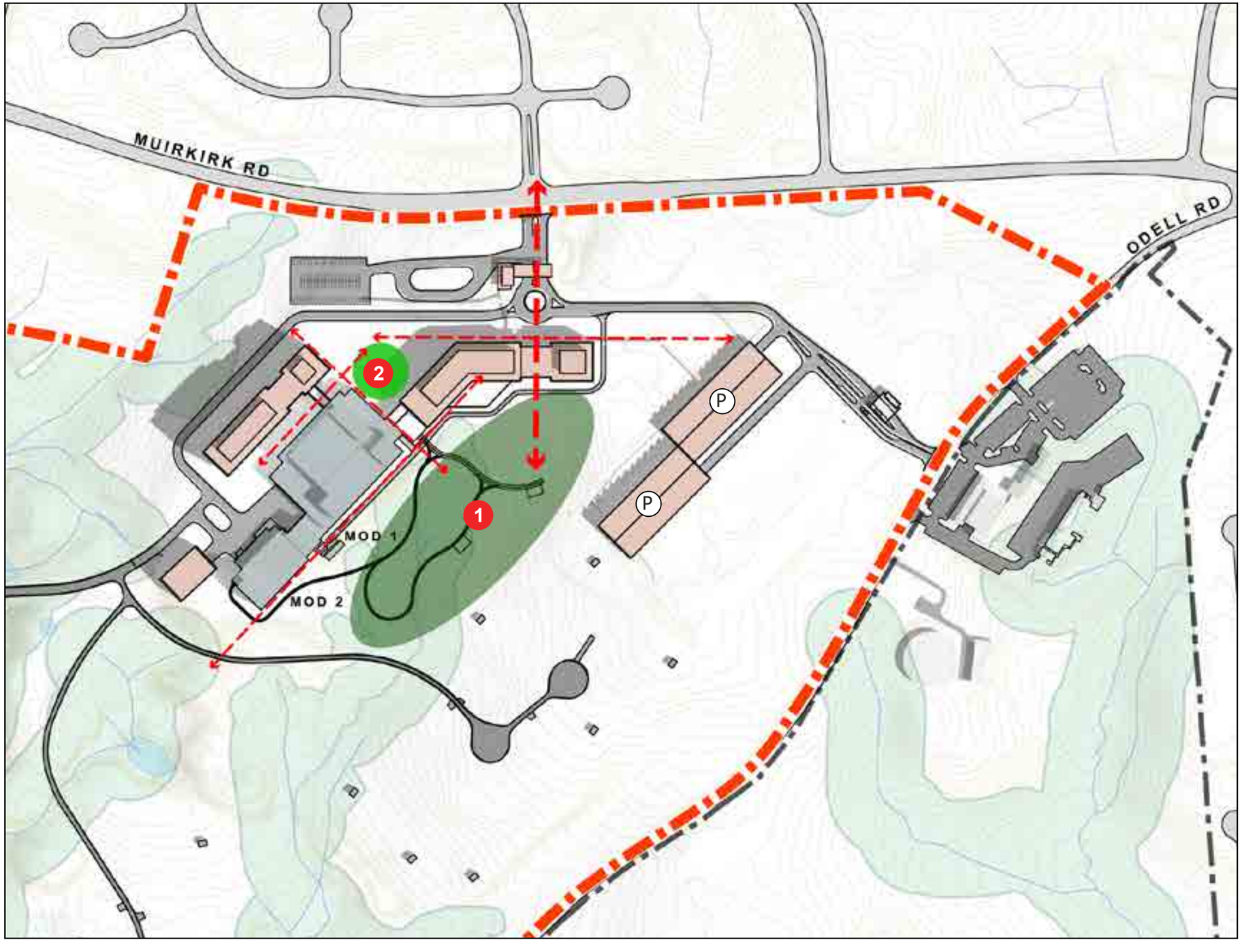


Figure 3-11: Alternative A concept diagram

Alternative A: Compact Campus; Integrating old and new

Illustrative Plan - Overall Land Use

1. New Office Building
2. New Parking Garage
3. Maintenance & Storage
4. Truck Screening
5. Covered Waiting Area/Visitors Check-in
6. Bus pick-up/drop-off
7. Surface Parking

SUSTAINABILITY FEATURES

1. Bioswale Adjacent to Roads & Parking Area
2. Green Roof
3. Solar Panels
4. Green Wall Adjacent to Parking Garage
5. Micro-Bioretention
6. Potential Underground S.W. Storage

LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- (P) Parking Structure
- Stream Valley Buffer

0 150 300 600 Feet

Figure 3-12: Alternative A illustrative plan

Alternative A: Compact Campus; Integrating old and new

Circulation Diagram

LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- Parking Structure
- Stream Valley Buffer
- Staff Vehicle Route
- Staff Pedestrian Route
- Visitors Vehicle Route
- Visitors Pedestrian Route
- Service Vehicle Route
- Internal Service Route
- Outer Fence
- Inner Fence
- Secured Area
- Primary Screening Entrance (Staff/Visitors)
- Potential Secured Entrance (Staff/Visitors)

0 150 300 600 Feet

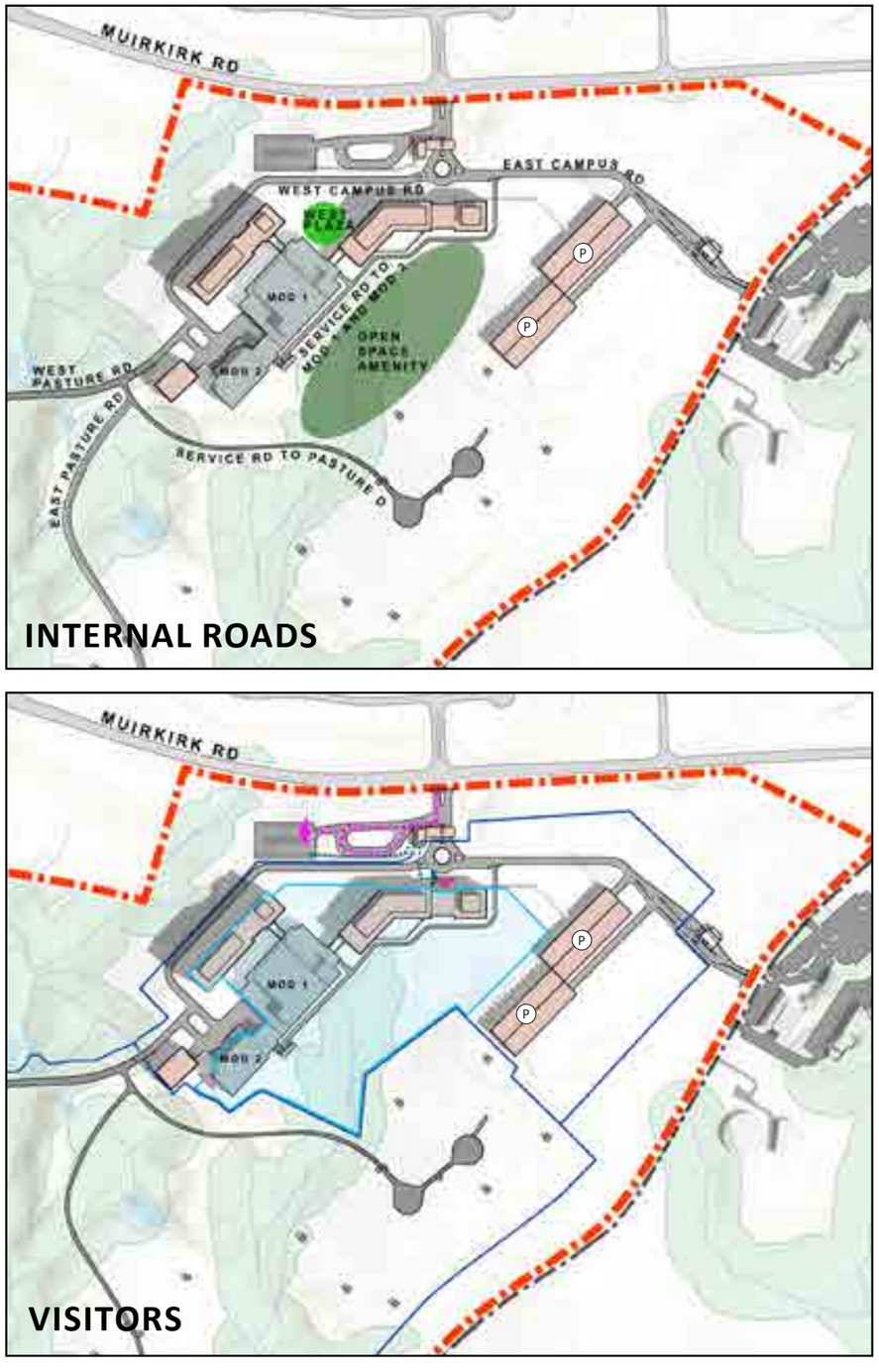


Figure 3-13: Alternative A circulation diagram

Alternative A: Compact Campus; Integrating old and new

Section A - A'

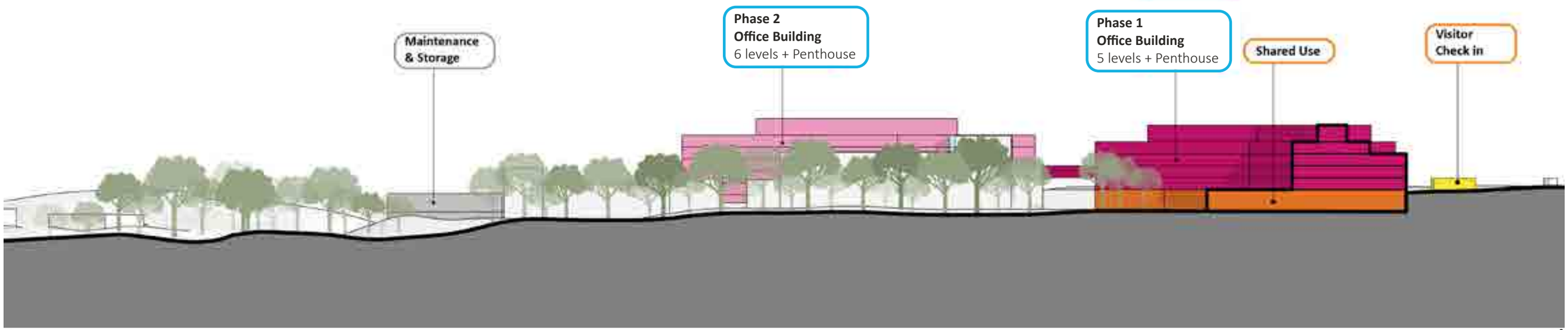


Figure 3-14: Alternative A section

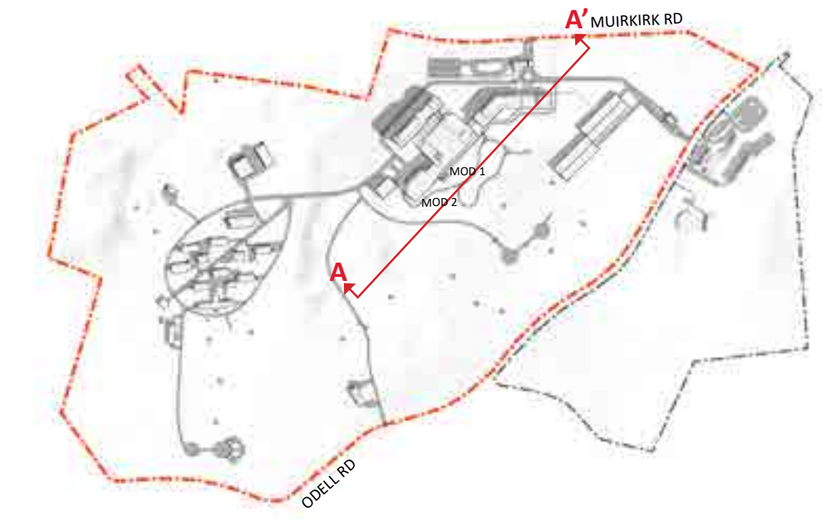


Figure 3-15: Alternative A section key plan

Alternative A: Compact Campus; Integrating old and new

Section B - B'

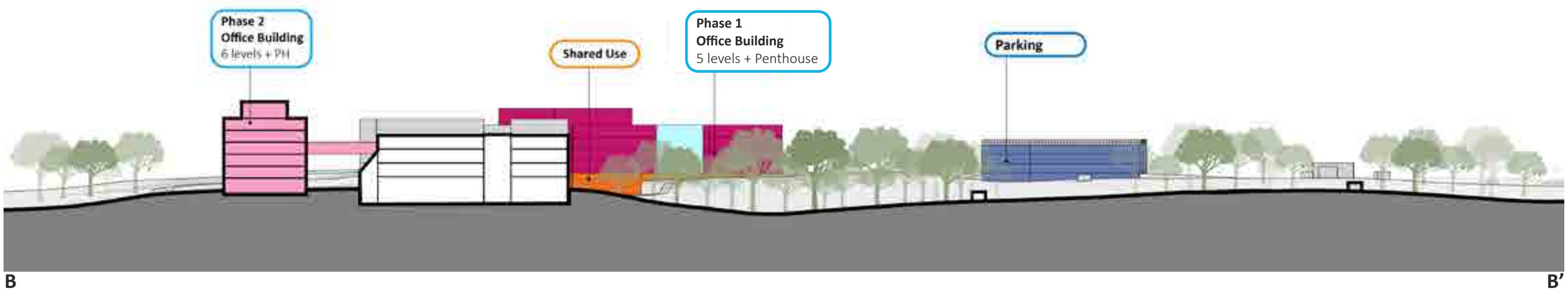


Figure 3-16: Alternative A section

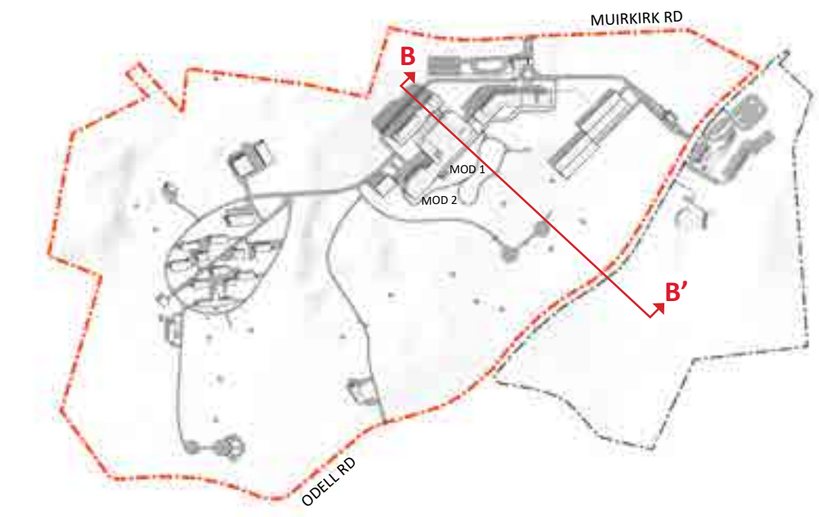


Figure 3-17: Alternative A section key plan

Alternative A: Compact Campus; Integrating old and new

View from Muirkirk Road Looking Southeast

Figure 3-18: Alternative A view from Muirkirk Road looking southeast

Alternative A: Compact Campus; Integrating old and new

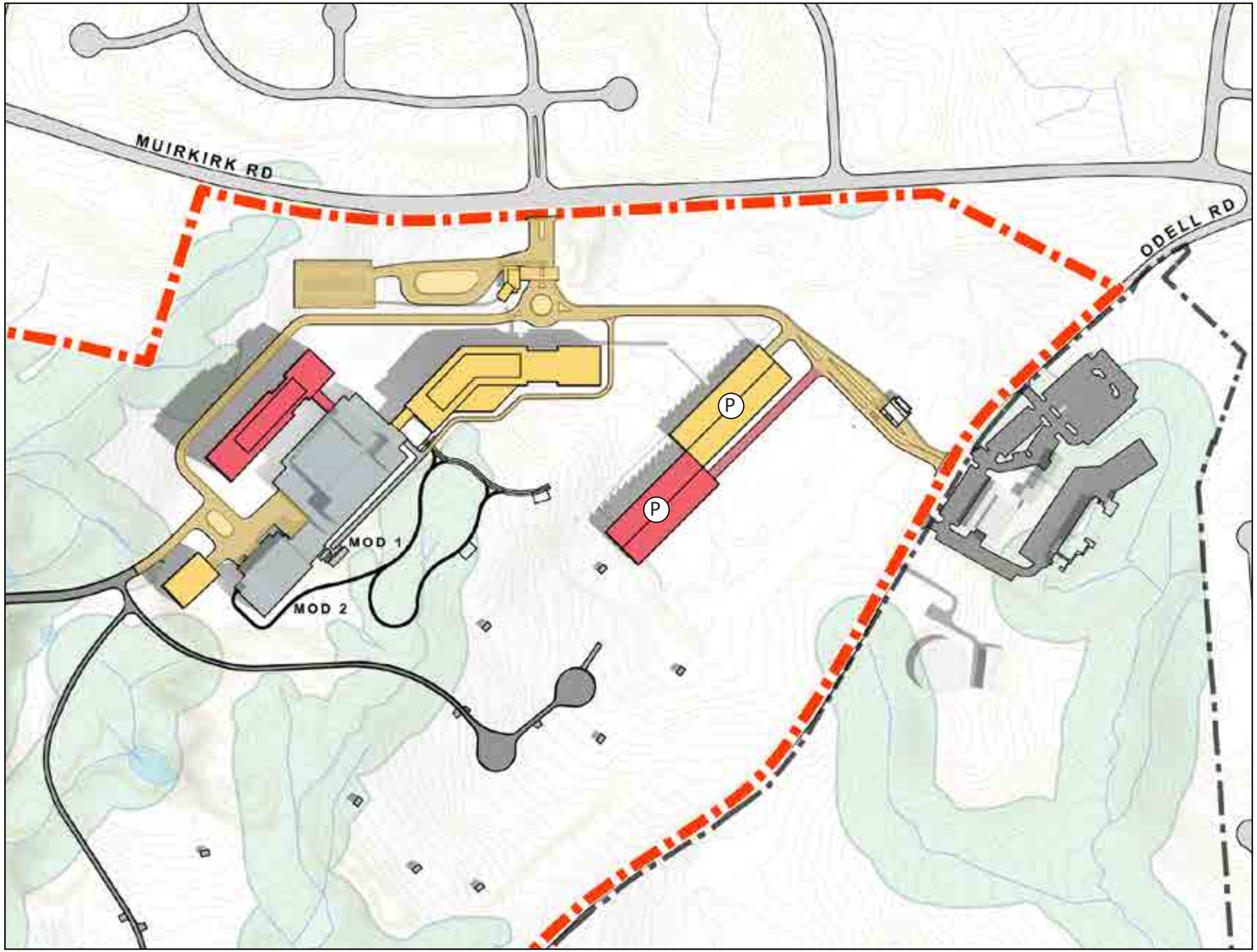
View from Muirkirk Road Looking East

Figure 3-19: Alternative A view from Muirkirk Road looking east

Alternative A: Compact Campus; Integrating old and new

View from Westlock Place Looking South

Figure 3-20: Alternative A view from Westlock Place looking south



LEGEND

- MRC
- East Parcel
- Existing Buildings
- Parking Structure
- Stream Valley Buffer
- Phase 1 Building
- Phase 1 New Road and Improvement
- Phase 2 Building
- Phase 2 New Road and Improvement

0 150 300 600 Feet

Figure 3-21: Alternative A phasing diagram

3.5 ALTERNATIVE B

DUAL CAMPUS; DISTRIBUTING DEVELOPMENT BETWEEN TWO SITES

In Alternative B two new buildings are placed to the northeast of MOD 1 and a third, smaller one to the south of MOD 2. Building heights stay within the range of the existing MOD 1. The scheme emphasizes connectivity and walkability. MOD 1 and the new building to the north are connected through an at-grade service corridor and an elevated walkway. The new buildings are connected by a two-level skybridge with programmable space. This is envisioned to be a prominent architectural feature. Like in Alternative A, the new building north of MOD 1 is visible from the main entrance at Muirkirk Road. However, most of the building volume will be screened by forested areas that form the perimeter landscape buffer. A strategically positioned atrium will allow for a view from the main entry, through the new building, into the forested stream valley at the center of the campus.

Most of the new building volumes are positioned between MOD 2 and the BRF site and embrace the central forested stream valley.

Alternative B includes the following:
- Three new office buildings up to 5 stories tall
- Two new parking garages, one at MOD 1 and MOD 2 and one at the BRF site
- One of the new parking garages will replace the surface parking lot west of MOD 1 and MOD 2
- A pedestrian bridge between MOD 1 and the new building to the north
- A direct connection between MOD 2 and the new office building to the south of MOD 2
- Space for shared amenities like a conference center, cafeteria, and fitness center in the podium of the first new office building to be built
- A two level (24,000 sf) skybridge is considered part of the Phase 2 building.

TOTAL NEW BUILDING AREA : 438,000 sf
(OFFICE AND SPECIAL SPACES ONLY)

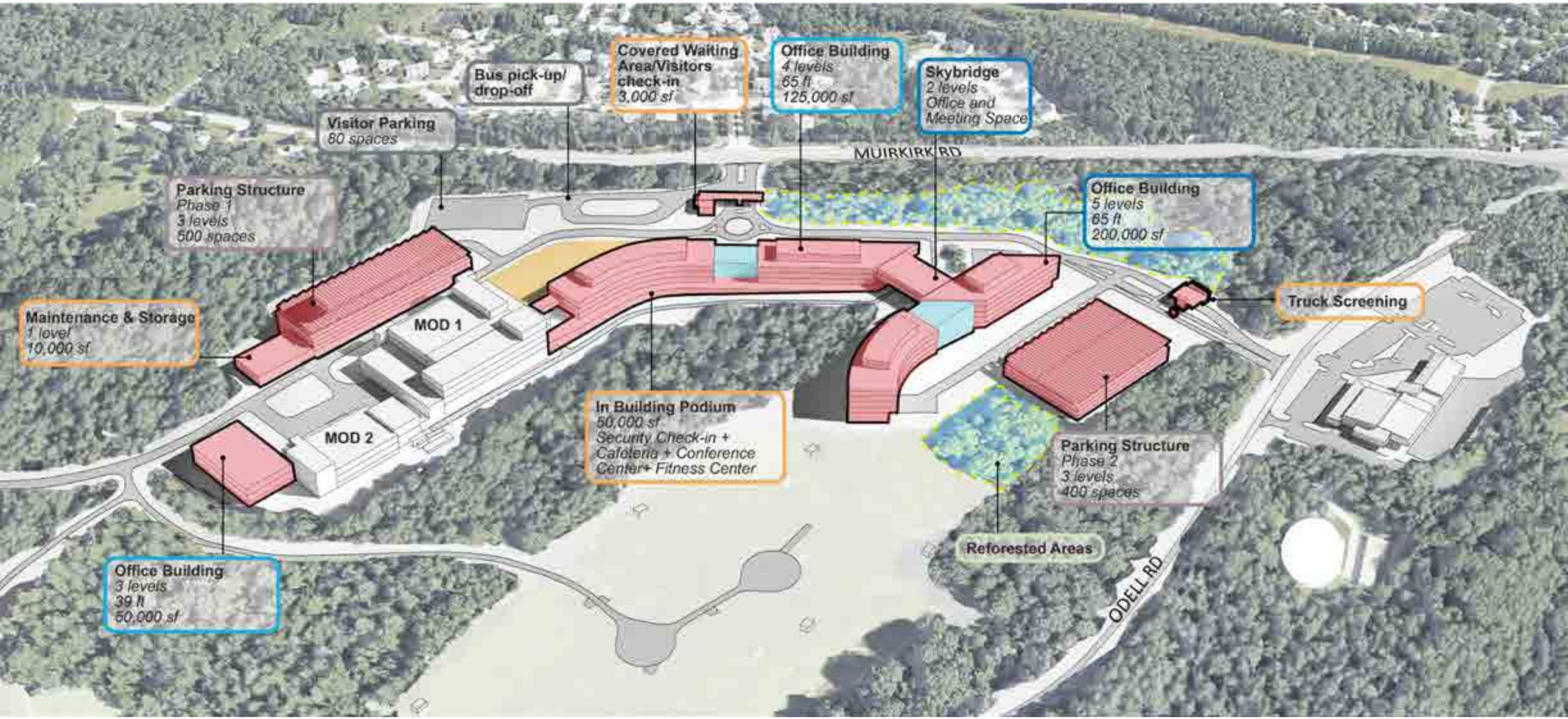
- **TOTAL OFFICE : 375,000 sf**
- **TOTAL SPECIAL USE AND SHARED USE : 63,000 sf**
  - Visitor Check In - 3,000 sf
  - Security Screening - 8,000 sf
  - Cafeteria - 10,000 sf
  - Conference Space - 16,000 sf
  - Fitness Center - 16,000 sf
  - Maintenance and Storage - 10,000 sf

TOTAL NEW PARKING : 980 Spaces
(New parking includes replacement of existing parking displaced by new buildings, and assumes parking at 1 space per 2 employees)

Table 3-3: Alternative B tabulations

Alternative B: Dual Campus; Distributing development between two sites

Aerial View Looking North



TOTAL NEW BUILDING AREA: 438,000 sf | TOTAL NEW PARKING : 980 Spaces

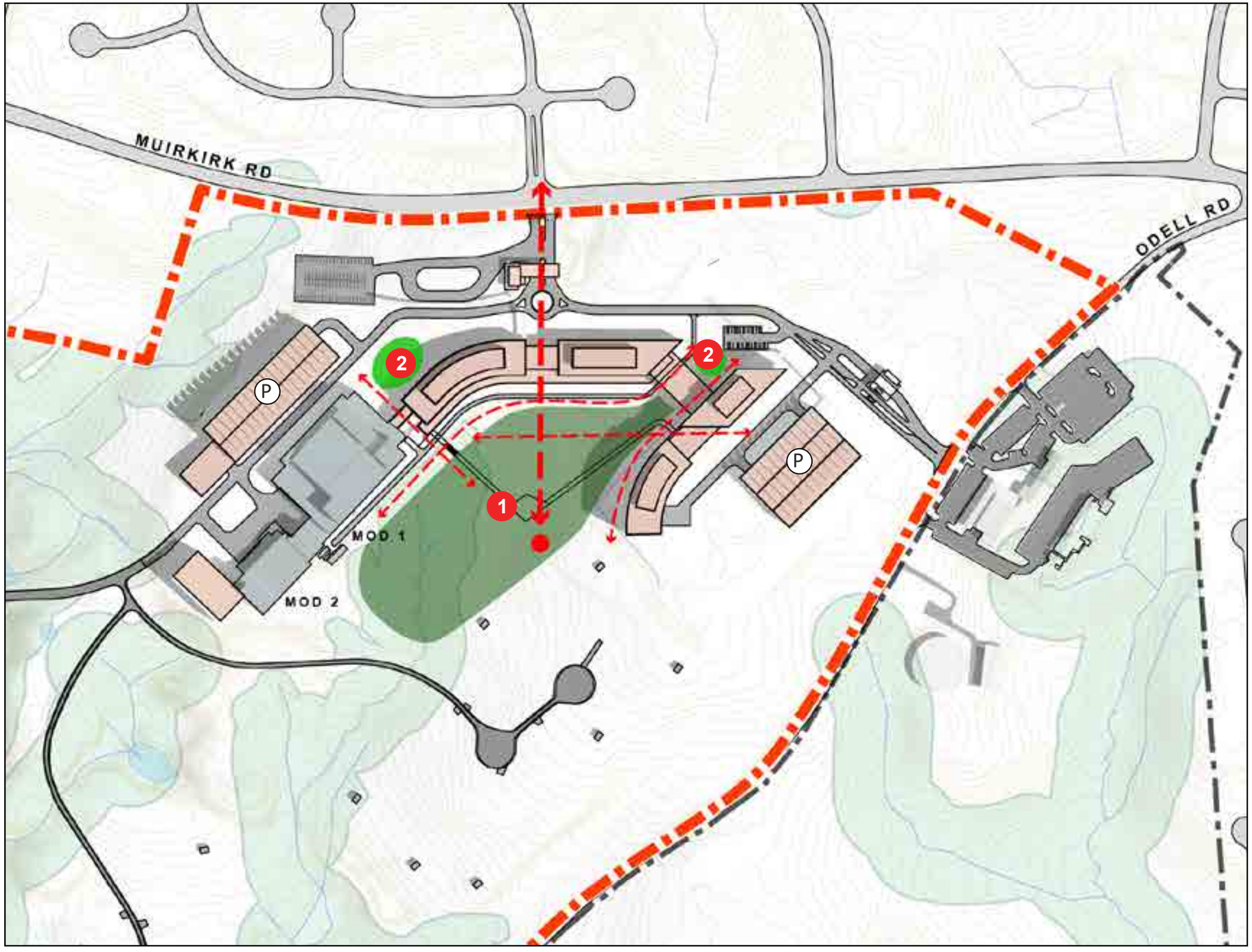
(New parking includes replacement of existing parking displaced by new buildings, and assumes parking at 1 space per 2 Employees)

Figure 3-22: Alternative B aerial view

Alternative B: Dual Campus; Distributing development between two sites

Concept Diagram

1. Natural landscape amenity space
2. Distributed campus landscape space



LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- (P) Parking Structure
- Axial Relationship
- Stream Valley Buffer

0 150 300 600 Feet

Figure 3-23: Alternative B concept diagram

Alternative B: Dual Campus; Distributing development between two sites

Illustrative Plan - Overall Land Use

1. New Office Building
2. New Parking Garage
3. Maintenance & Storage
4. Truck Screening
5. Covered Waiting Area/Visitors Check-in
6. Bus pick-up/drop-off
7. Surface Parking

SUSTAINABILITY FEATURES

1. Bioswale Adjacent to Roads & Parking Area
2. Green Roof
3. Solar Panels
4. Green Wall Adjacent to Parking Garage
5. Micro-Bioretention
6. Potential Underground S.W. Storage

LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- (P) Parking Structure
- Stream Valley Buffer

0 150 300 600 Feet

Figure 3-24: Alternative B illustrative plan

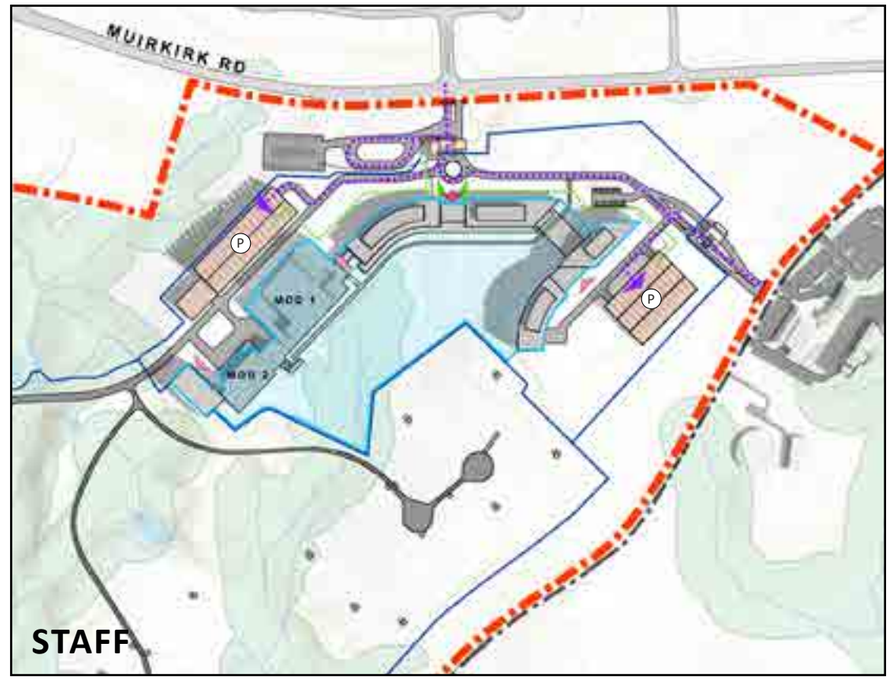
Alternative B: Dual Campus; Distributing development between two sites

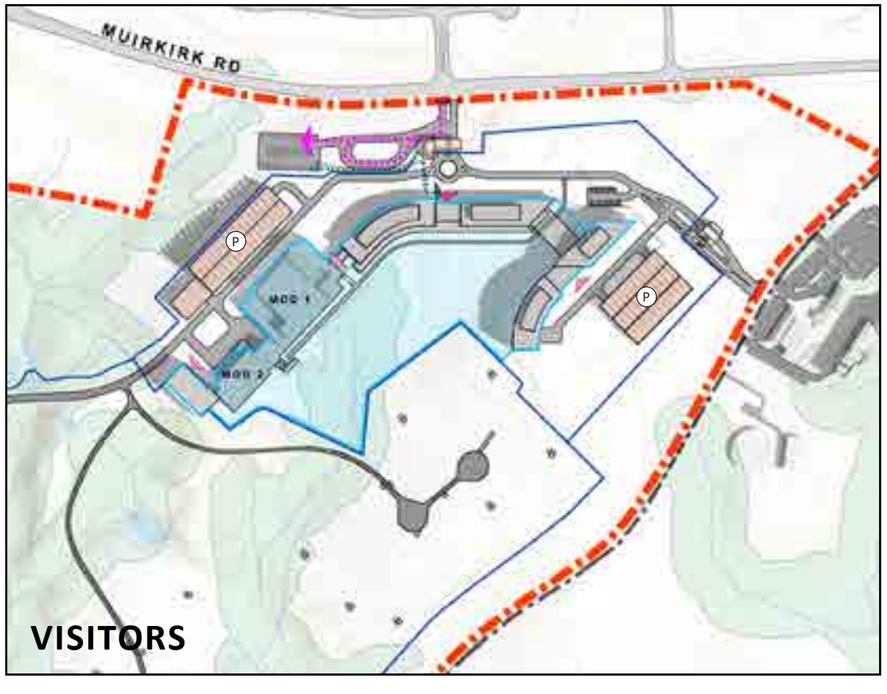
Circulation Diagram

LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- (P) Parking Structure
- Stream Valley Buffer
- Staff Vehicle Route
- Staff Pedestrian Route
- Visitors Vehicle Route
- Visitors Pedestrian Route
- Service Vehicle Route
- Internal Service Route
- Outer Fence
- Inner Fence
- Secured Area
- Primary Screening Entrance (Staff/Visitors)
- Potential Secured Entrance (Staff/Visitors)

0 150 300 600 Feet





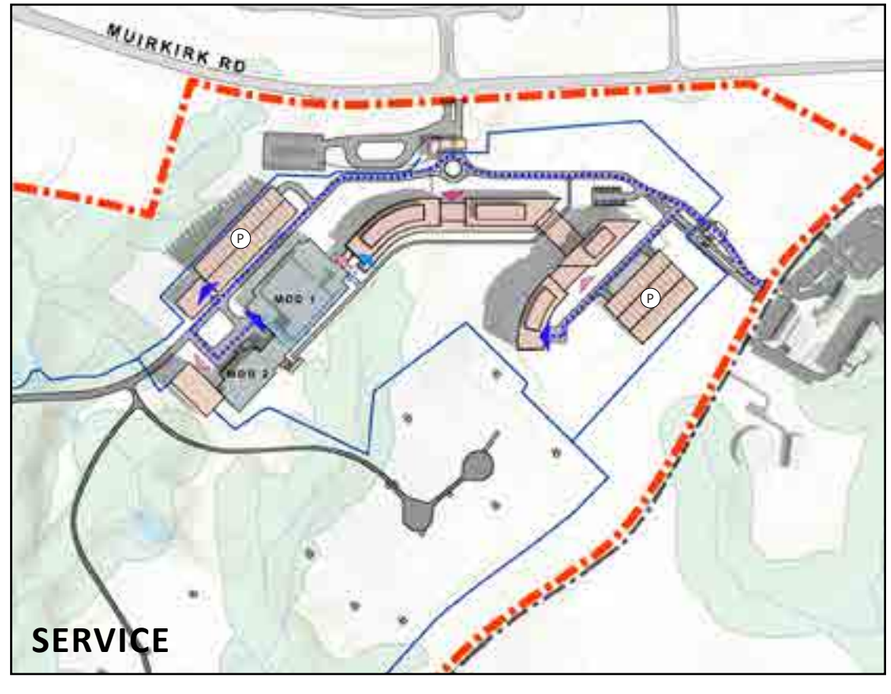


Figure 3-25: Alternative B circulation diagram

Alternative B: Dual Campus; Distributing development between two sites

Section A - A'

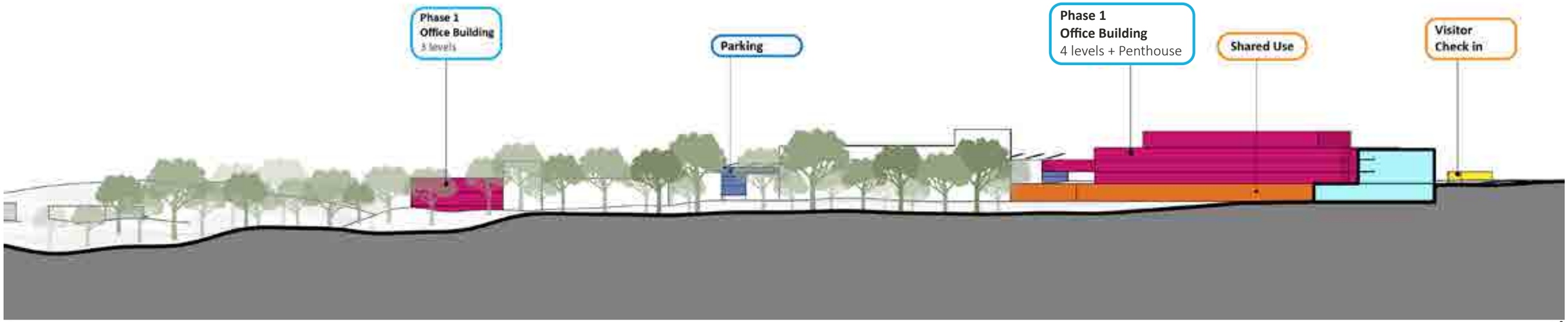


Figure 3-26: Alternative B section

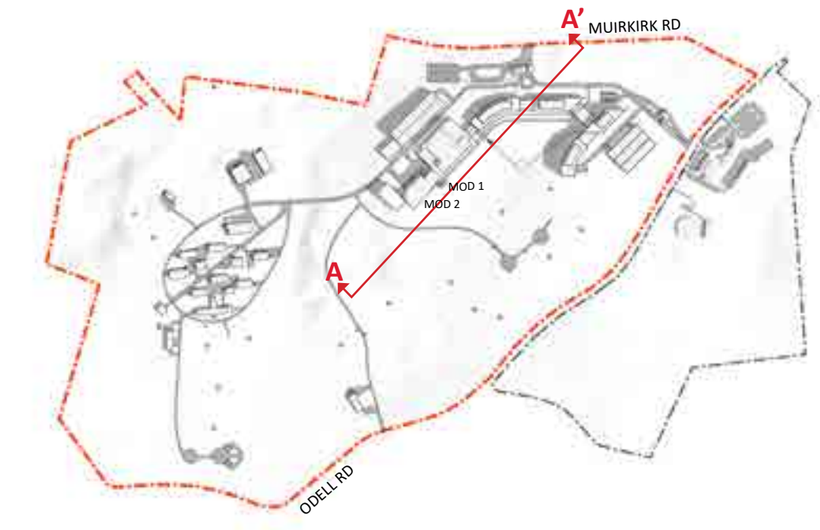


Figure 3-27: Alternative B section key plan

Alternative B: Dual Campus; Distributing development between two sites

Section B - B'

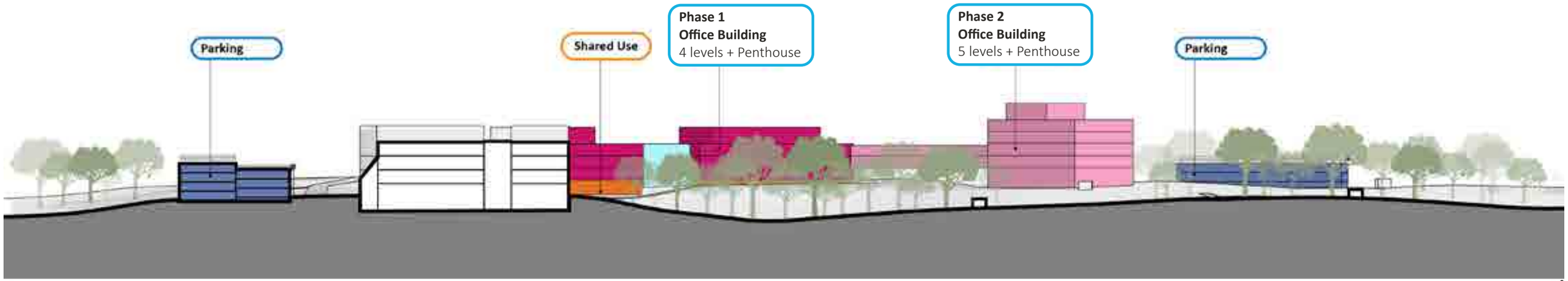


Figure 3-28: Alternative B section

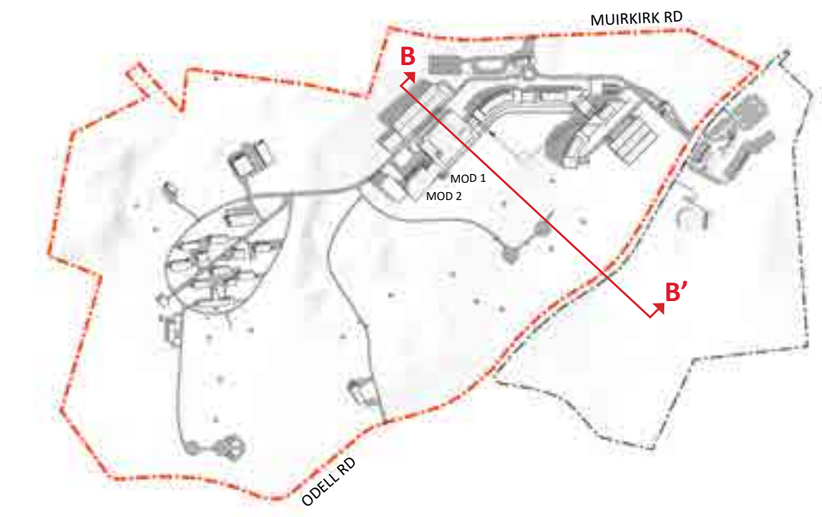


Figure 3-29: Alternative B section key plan

Alternative B: Dual Campus; Distributing development between two sites

View from Muirkirk Road Looking Southeast

Figure 3-30: Alternative B view from Muirkirk Road looking southeast

Alternative B: Dual Campus; Distributing development between two sites

View from Muirkirk Road Looking East

Figure 3-31: Alternative B view from Muirkirk Road looking east

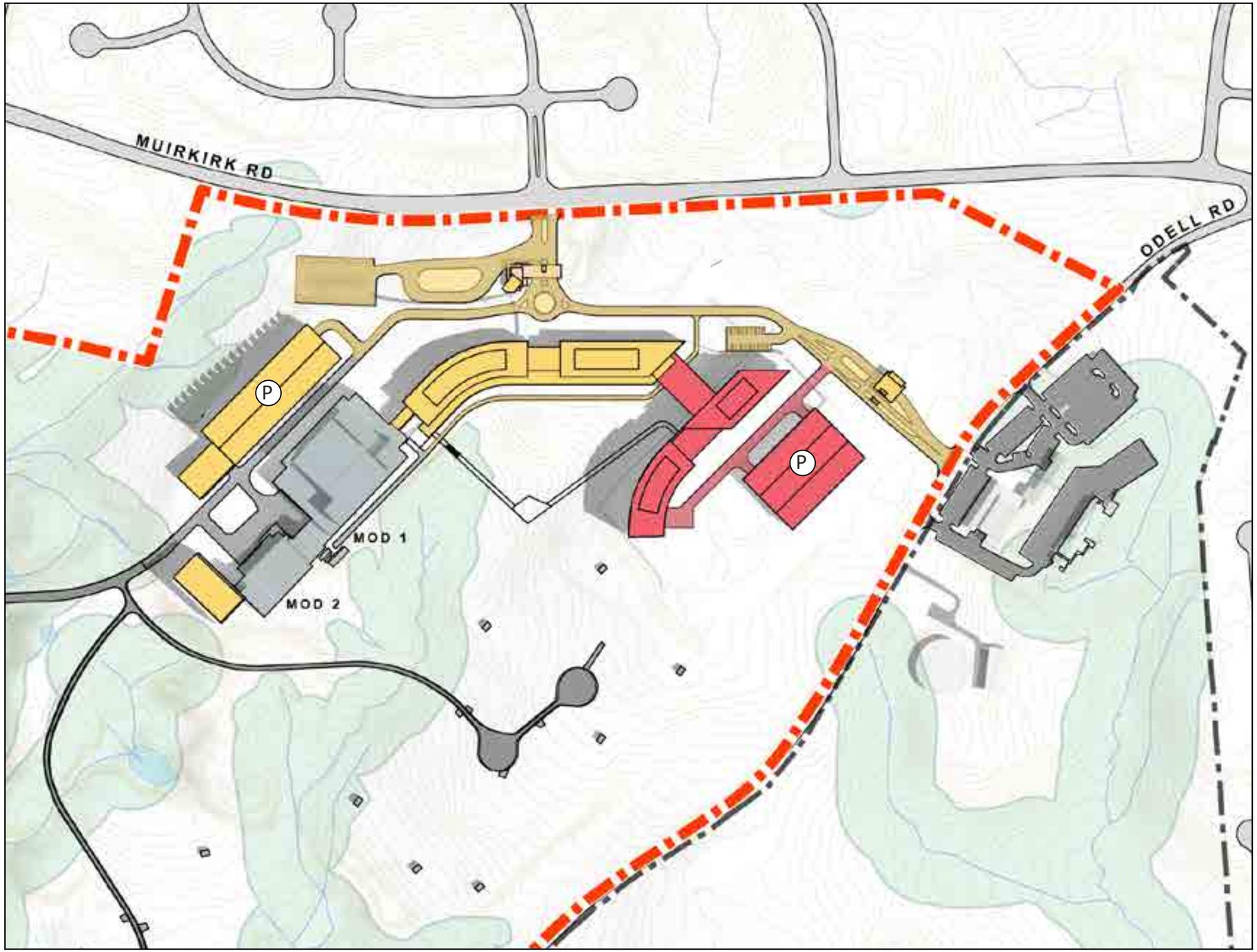
Alternative B: Dual Campus; Distributing development between two sites

View from Westlock Place Looking South

Figure 3-32: Alternative B view from Westlock Place looking south

Alternative B: Dual Campus; Distributing development between two sites

Implementation Plan



LEGEND

- MRC
- East Parcel
- Existing Buildings
- Parking Structure
- Stream Valley Buffer
- Phase 1 Building
- Phase 1 New Road and Improvement
- Phase 2 Building
- Phase 2 New Road and Improvement

0 150 300 600 Feet

Figure 3-33: Alternative B phasing diagram

3.6 ALTERNATIVE C

NORTHEAST CAMPUS; REIMAGINING THE BRF

In Alternative C two new buildings are placed at the BRF site. The building heights are higher than the existing one-story buildings at the BRF site. This alternative envisions two new, free-standing buildings at the BRF site. To enhance connectivity, the scheme allows for a covered, at-grade walkway between the new buildings. It would also be possible to connect the new buildings via an underground service corridor. Unlike Alternatives A and B, the ground floor of the new buildings is only partially below grade. The new buildings will barely be visible from the main entrance at Muirkirk Road as most of the building volume will be screened by forested areas that form the perimeter landscape buffer. The forested stream valley at the center of the campus will be visible from the main entrance at Muirkirk Road.

EMPLOYEES	1800
OFFICE (PHASE 1)	175k sf
OFFICE (FUTURE PHASES)	200k sf
NEW SPECIAL SPACES	63k sf
PARKING SURFACE SPACES	230 spaces
PARKING GARAGE SPACES	750 spaces
SITE INFRASTRUCTURE	

Table 3-4: Alternative C tabulations

New buildings would be positioned between MOD 1 and MOD 2 and the BRF site to facilitate a walkable campus. The buildings would be barely visible from Muirkirk Road.

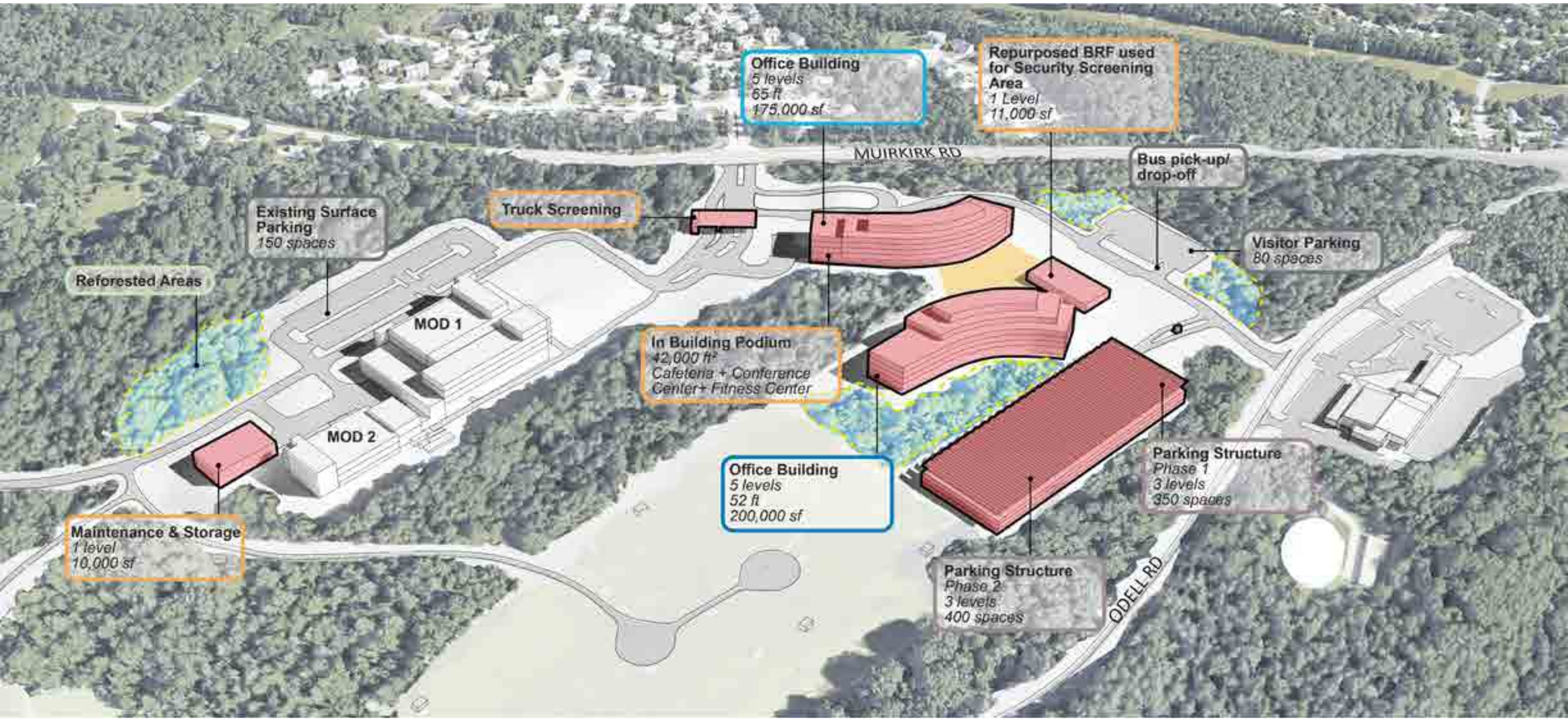
Alternative C would also include the following:
- Two new, connected office buildings of 5 stories
- Two new parking garages to the east of the new buildings at the BRF site
- A significant portion of the existing surface parking lot adjacent to MOD 1 and MOD 2 will be returned to the natural landscape with a pervious surface. Of the 283 surface parking spaces currently located here, only 150 would remain. These remaining 150 spaces will be improved with bioswales for capturing stormwater and overhead solar panels (see Figure 3-108)
- A space for shared amenities like a conference center, cafeteria, and fitness center in the podium of the first new office building to be built

TOTAL NEW BUILDING AREA : 438,000 sf
(OFFICE AND SPECIAL SPACES ONLY)

- **TOTAL OFFICE : 375,000 sf**
- **TOTAL SPECIAL USE AND SHARED USE : 63,000 sf**
  - Visitor Center and Security Screening (repurposed BRF) - 11,000 sf
  - Cafeteria - 10,000 sf
  - Conference Space - 16,000 sf
  - Fitness Center - 16,000 sf
  - Maintenance and Storage - 10,000 sf

TOTAL NEW PARKING : 750 Spaces
(New parking includes replacement of existing parking displaced by new buildings, and assumes parking at 1 space per 2 employees)

Aerial View Looking North



TOTAL NEW BUILDING AREA: 438,000 sf | TOTAL NEW PARKING : 750 Spaces

(New parking includes replacement of existing parking displaced by new buildings, and assumes parking at 1 space per 2 Employees)

Figure 3-34: Alternative C aerial view

Alternative C: Northeast Campus; Reimagining the BRF

Concept Diagram

1. Natural landscape amenity space
2. Distributed campus landscape space

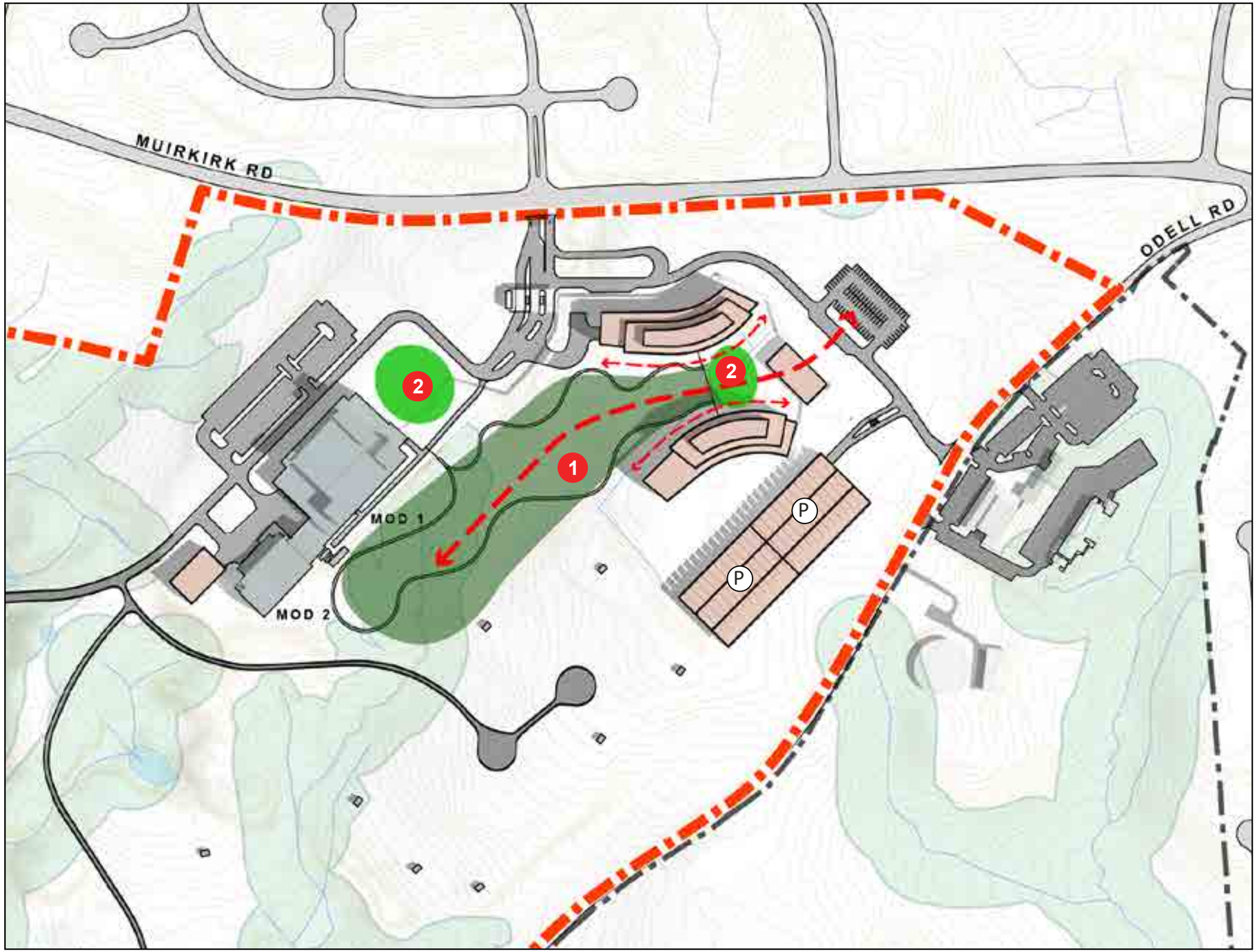


Figure 3-35: Alternative C concept diagram

Alternative C: Northeast Campus; Reimagining the BRF

Illustrative Plan - Overall Land Use

1. New Office Building
2. New Parking Garage
3. Maintenance & Storage
4. Truck Screening
5. Covered Waiting Area/Visitors Check-in
6. Bus pick-up/drop-off
7. Surface Parking

SUSTAINABILITY FEATURES

1. Bioswale Adjacent to Roads & Parking Area
2. Green Roof
3. Solar Panels
4. Green Wall Adjacent to Parking Garage
5. Micro-Bioretention
6. Potential Underground S.W. Storage

LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- (P) Parking Structure
- Stream Valley Buffer

0 150 300 600 Feet

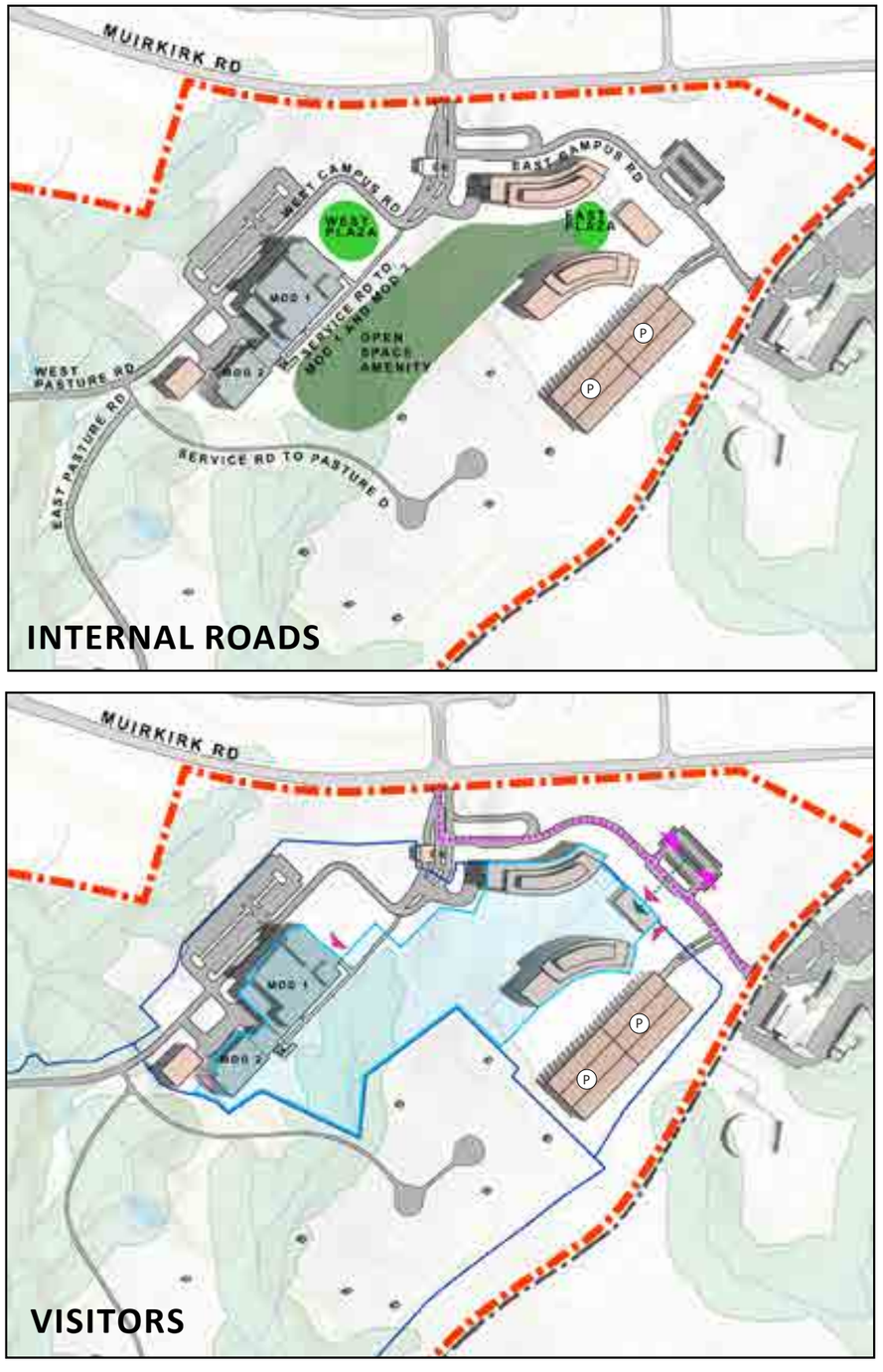
Figure 3-36: Alternative C illustrative plan

Circulation Diagram

LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- (P) Parking Structure
- Stream Valley Buffer
- Staff Vehicle Route
- Staff Pedestrian Route
- Visitors Vehicle Route
- Visitors Pedestrian Route
- Service Vehicle Route
- Internal Service Route
- Outer Fence
- Inner Fence
- Secured Area
- Primary Screening Entrance (Staff/Visitors)
- Potential Secured Entrance (Staff/Visitors)

0 150 300 600 Feet



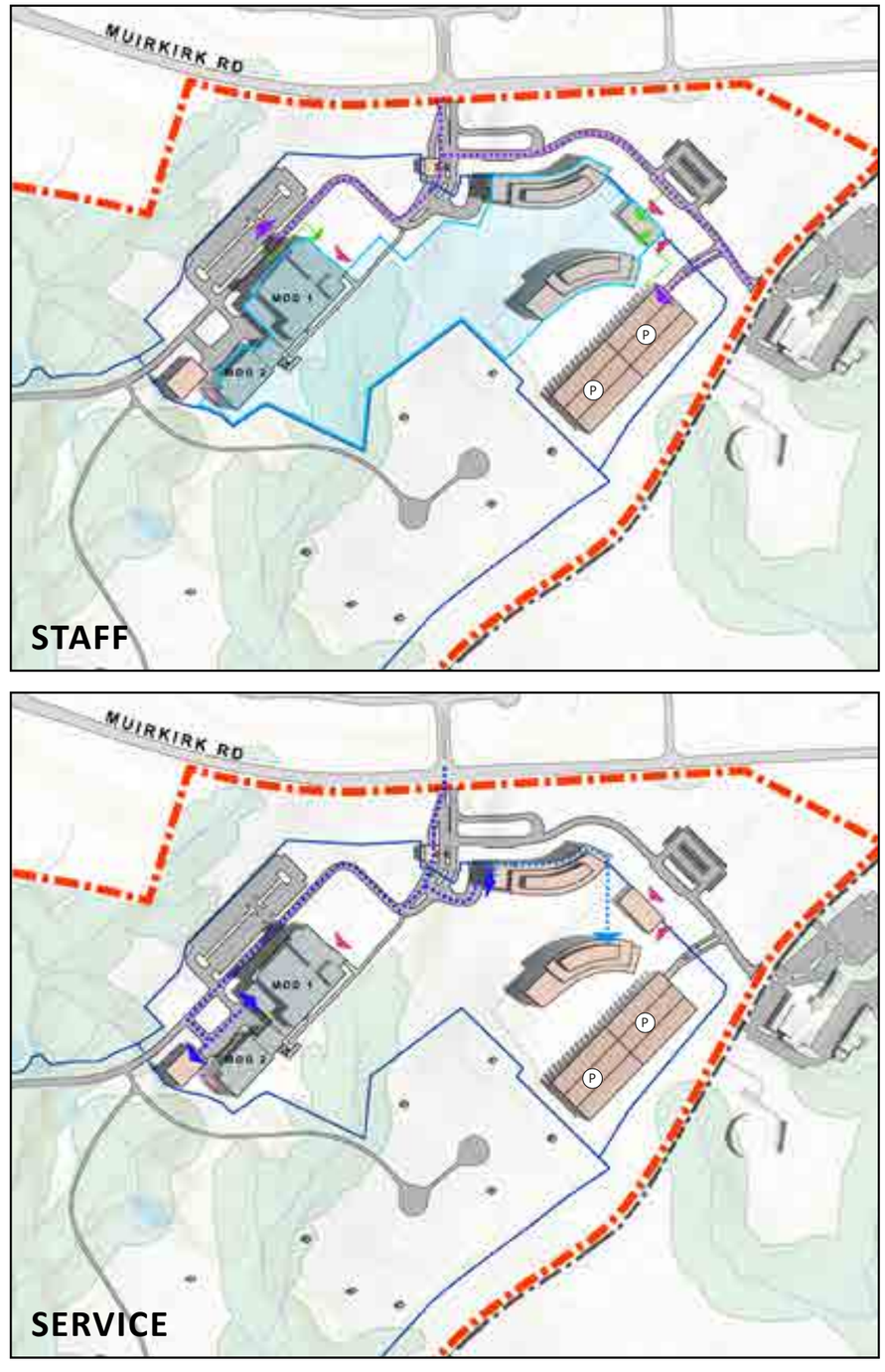


Figure 3-37: Alternative C circulation diagram

Alternative C: Northeast Campus; Reimagining the BRF

Section A - A'

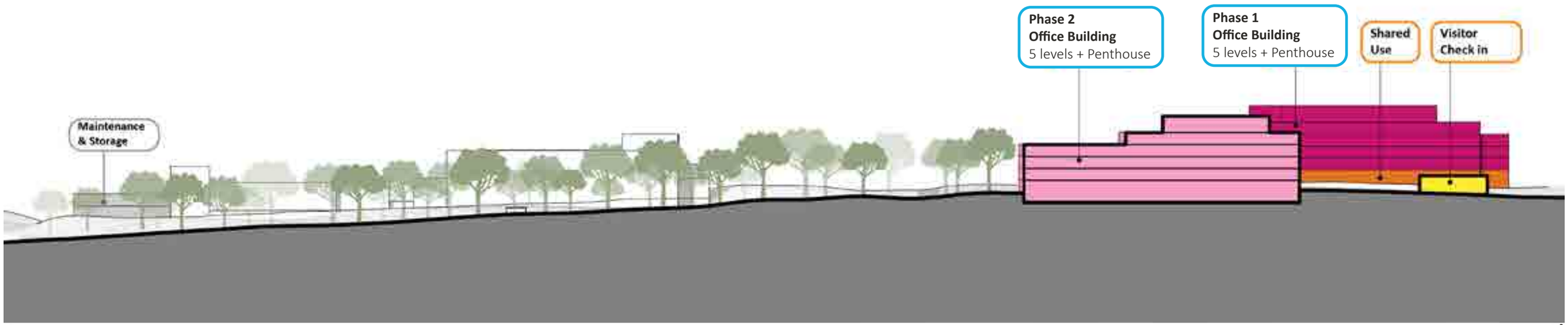


Figure 3-38: Alternative C section

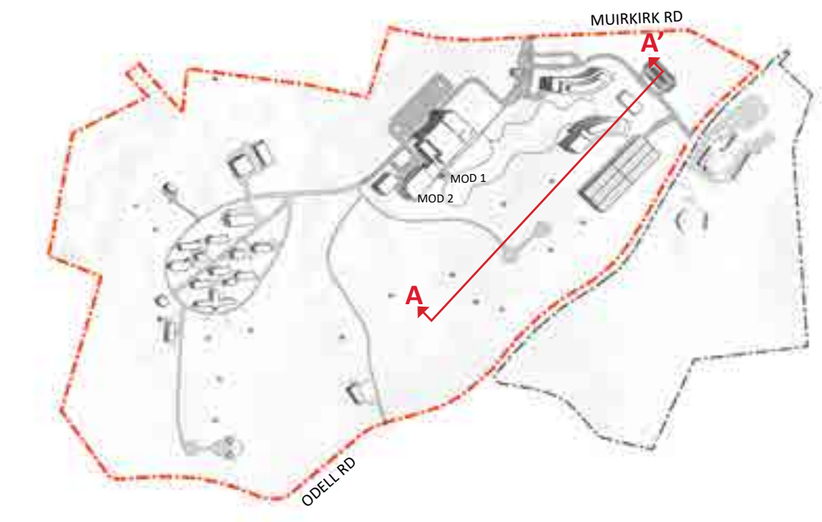


Figure 3-39: Alternative C section key plan

Section B - B'

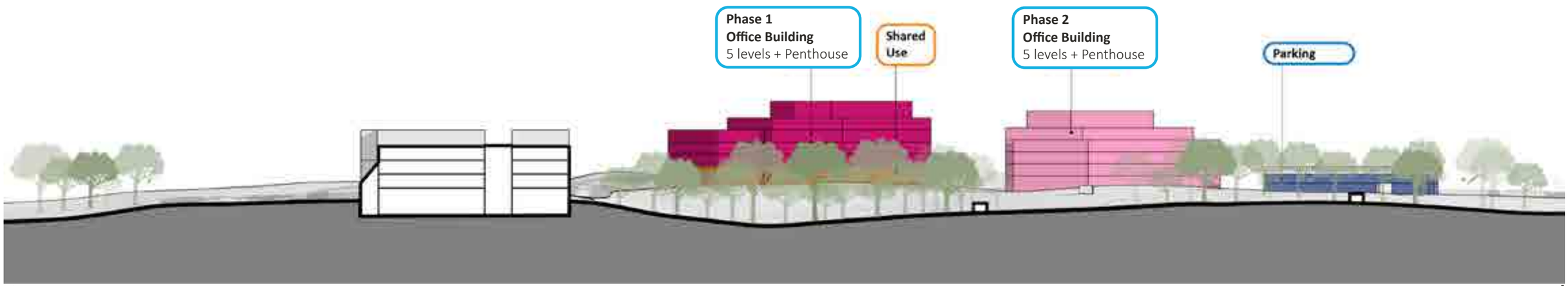


Figure 3-40: Alternative C section

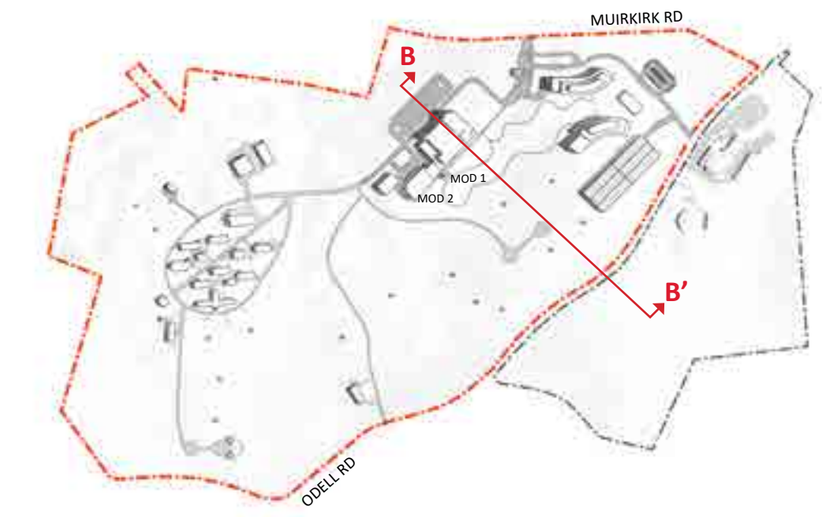


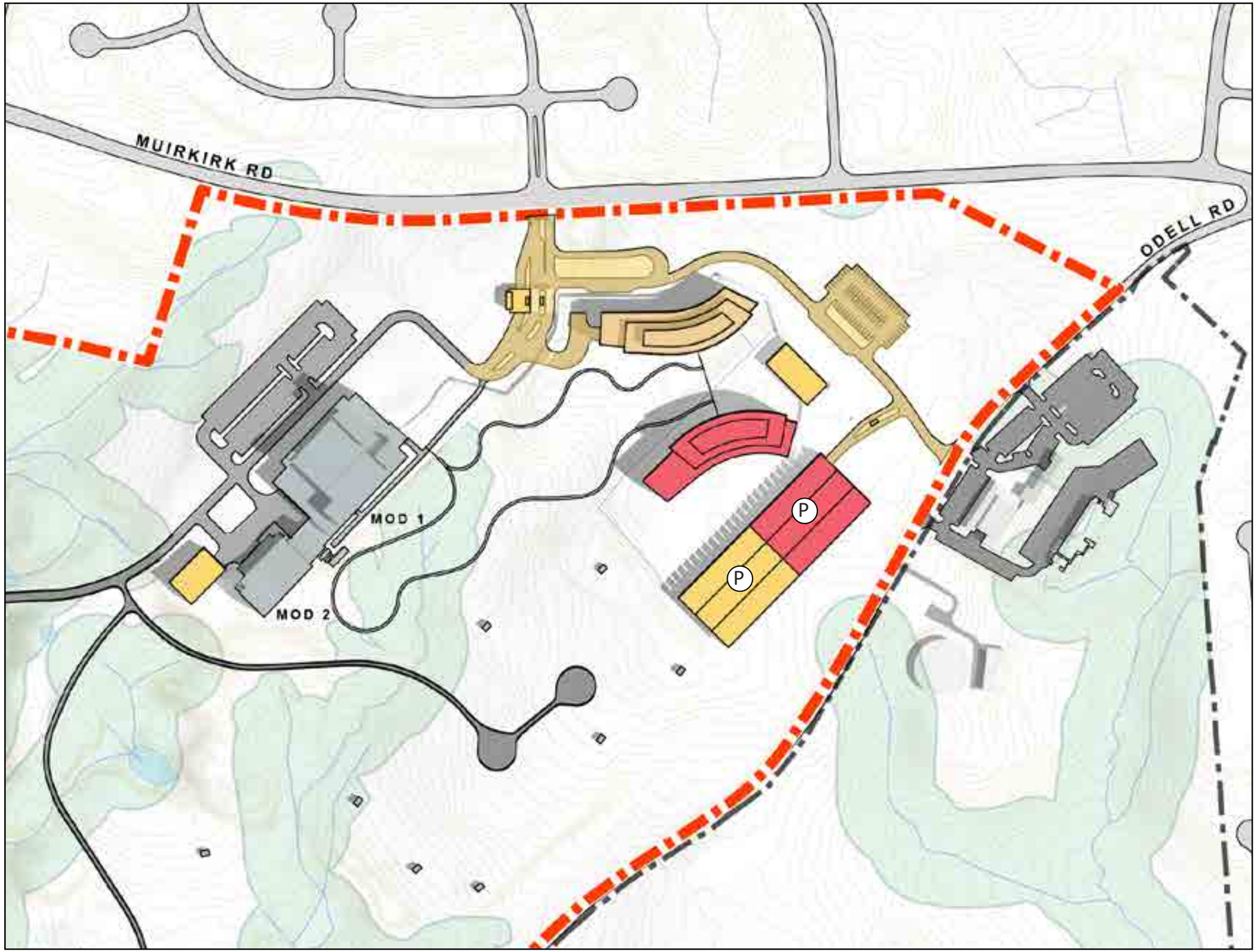
Figure 3-41: Alternative C section key plan

Figure 3-42: Alternative C view from Muirkirk Road looking southeast

Figure 3-43: Alternative C view from Muirkirk Road looking east

View from Westlock Place Looking South

Figure 3-44: Alternative C view from Westlock Place looking south



LEGEND

- MRC
- East Parcel
- Existing Buildings
- Parking Structure
- Stream Valley Buffer
- Phase 1 Building
- Phase 1 New Road and Improvement
- Phase 2 Building

0 150 300 600 Feet

Figure 3-45: Alternative C phasing diagram

3.7 Architectural Character

The existing architectural character of the MRC was established through building and landscape design which:
• respected the topography and natural landscape,
• cleared the pasture areas but largely retained the wooded character,
• employed extensive screening with natural growth at the perimeter, and
• located each building to take advantage of the natural setting and minimize the need for extensive grading.

The landscape design philosophy was to:
• retain the natural qualities of the site, including roughness of terrain, thick tree, and ground cover,
• exploit natural qualities to develop the buffer, and
• maintain the open space atmosphere.

Key characteristics of the MRC are:
• Low density, buildings few and far apart and concentrated in one main built area
• Corporate campus look and feel
• Modern architecture
• Buildings are modest in scale and appearance
• Masonry palette (red brick facades, brown window frames, dark windows)
• Verdant campus grounds

It should be noted that the architecture of MOD 1 and MOD 2 was a departure from the BRF. The one-story building at the BRF has more transparency and is constructed with a lighter brick, aluminum window frames and clear glass.

Campus Identity

The MRC identity is not well defined and minimally expressed. The campus can be characterized as:
• introverted, which is reflective of the research-related activities on the site,
• inward-facing, which is opposite of the goal to promote FDA as a public institution, and
• hard to read, which is in part because of the lack of way-finding signage at the entrance and on the site.

Desired Image

The desired image of the MRC could be achieved by:
• promoting FDA as a forward-looking scientific federal institution, of significant stature, inspiring dignity, and permanence,
• assimilating the look and feel that ties this campus to FDA's Headquarters at White Oak and the CFSAN in College Park in establishing the FDA identity,
• advancing the MRC's material pallet to reflect the cutting-edge science of FDA while maintaining continuity with existing masonry buildings and creating a collegiate campus environment,
• maximizing daylight in the interior to create a healthy work environment and maximize views to the natural environment by using narrower floorplates and glass,
• using glass appropriately to minimize heat gain and glare, and
• applying mass timber construction to both reduce the carbon footprint and to create a warm, rich interior environment.

Figure 3-46: Main entrance of MOD 1 view looking south from access road

Figure 3-47: MOD 2 view looking northeast

Figure 3-48: BRF building entrance

Using Building Mass for Shade / Cover Walkway Precedent Imagery

Figure 3-49: Precedent imagery of using building mass for shade / cover walkway

Covered Walkway Precedent Imagery

Figure 3-50: Precedent imagery of covered walkways

Placement and Treatment of Antennas and Satellite Dishes

The placement and treatment of antennas and satellite dishes on buildings and around the site should be carefully considered to avoid impact on views and minimize visibility. This includes the impact of radiofrequency emissions on users of the campus.

Federal agencies should evaluate the cumulative effect of multiple transmitters at one location to ensure that the combined radiofrequency emissions continue to meet Federal Communications Commission (FCC) guidelines. All measures should be coordinated with local historic preservation requirements.

NCPC's Comprehensive Plan includes criteria for new building design that specifically address the need for antennas. According to NCPC, federal agencies should anticipate the need for antennas on all new buildings and incorporate, as necessary, any screening or other components into the building's design to reduce their visibility. As much as they may be anticipated, locations or zones on installations that permit antennas should be considered, identified, and included as part of federal agency master plans.

NCPC requires agencies to:
- Consider the joint-use of antennas and collocating antennas to reduce aesthetic impacts and limit the area of radiofrequency exposure, and
- Minimize visual impacts of telecommunication antennas proposed for the rooftop of a building by using a variety of tools including, but not limited to, matching building colors and design, incorporating screens, and moving antennas away from the building's edge.

See Figure 3-51 for examples of strategies to minimize the visual impact of antennas.

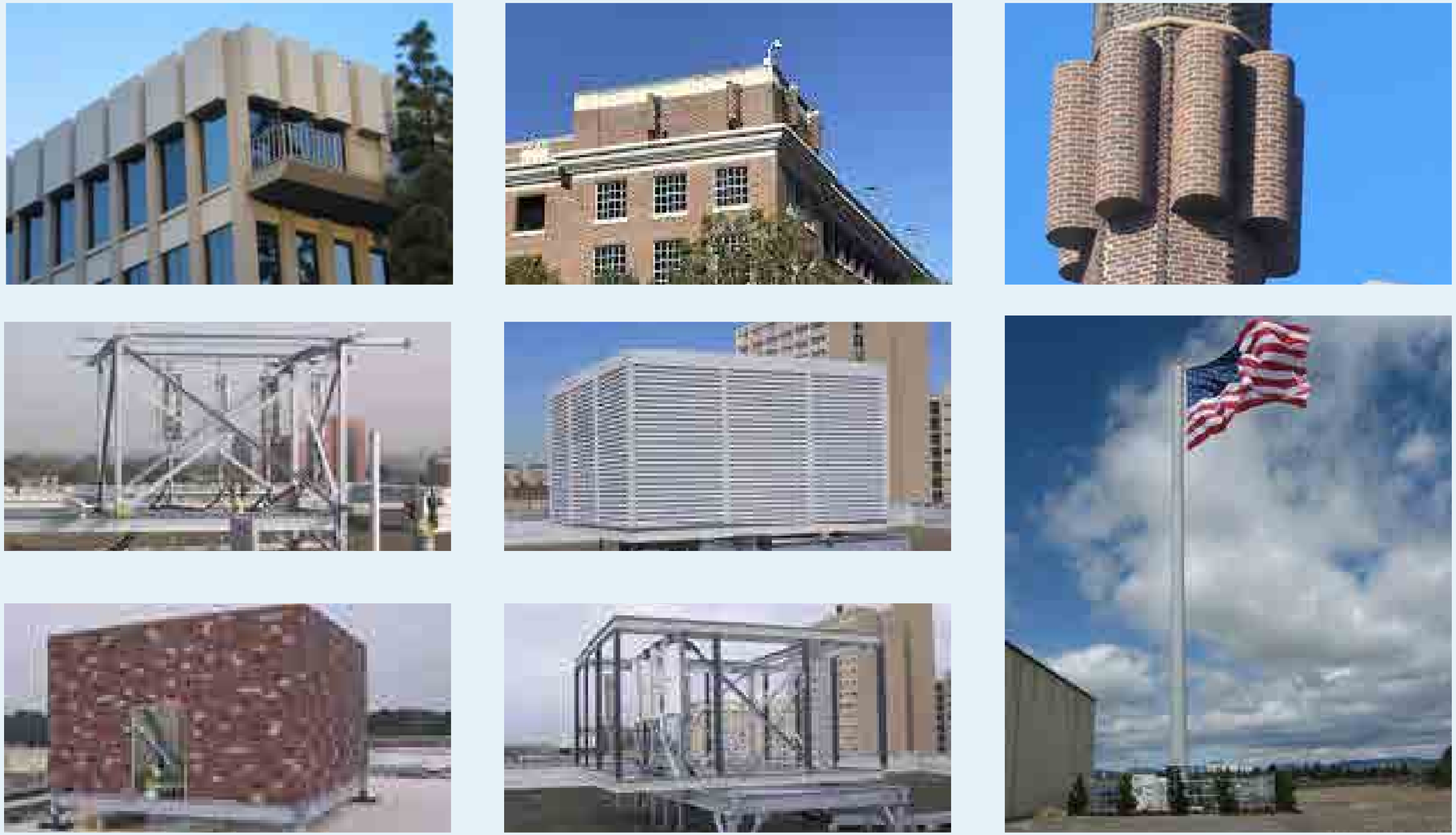


Figure 3-51: Precedent imagery showing placement and treatment of antennas and satellite dishes on buildings

3.8 Streetscape and Landscape Design

Existing Landscape & Streetscape

The largely untouched natural landscape gives the MRC its unique character and distinctive identity. Most of the campus is made up of densely forested areas and open pastures, shaped by multiple stream valleys, steep slopes, and significant grade changes. The built areas have been chosen because they are in relatively flat parts of the site. The space for buildings and roads has been carved out of the forest. The buildings are screened by trees and for the most part, are not visible from the surrounding areas. The forested areas are not accessible and only a few paved, unmarked roads connect the uses on the site. The pastures are manmade and are an integral part of the Animal Research Facility. Access to the pastures is restricted to authorized personnel only. There is no pedestrian or open space network. Except for two small outdoor seating areas near MOD 1 and MOD 2, and sidewalks around MOD 1 and MOD 2 and the large, surface parking lot to the west of the buildings, the campus is devoid of pedestrian connections, plazas, and parks.

Proposed Design & Improvement

New development on the site will take full advantage of the landscape qualities and treat the forested area and stream valley in between MOD 1 and MOD 2 and the BRF site as an amenity for the employees and visitors. The future campus is envisioned as an eco-focused collaborative campus. Strategies to achieve this aspiration are to utilize the site's natural features as an amenity, to preserve and protect stream valleys and to create a variety of exterior common spaces. Vegetation selection and layout will be used to emphasize views, ensure security and safety, highlight places for people in the natural landscape and meet performance expectations in stormwater management areas. The plant palette will change depending on soil depth and structure in certain areas, but this will only enhance the diversity and seasonality of the landscape. Perimeter security features, lighting, and signage are key elements to ensure a functional, safe, and user-friendly campus experience. Site elements will be selected carefully to enhance and complement the natural landscape. Security features such as bollards, curb walls, ha-ha or knee walls will be designed to blend into the landscape as much as possible to maintain a welcoming appeal.

Relationship to the Adjacent Public Area

Past approvals for development on the site, required a 300-foot landscape buffer to separate the campus from the residential properties along Ellington Drive at the southwestern boundary of the campus and a 100-foot landscape buffer for the rest of the site. The Master Plan will respect the existing landscape buffer and carefully consider viewsheds to minimize the visibility of new buildings from the main roads and residential communities to the north and east of the site. For security and safety reasons, the site is fenced in and entry points are gated. The campus is not accessible to the public. The Master Plan assumes a continuation of the current uses on the site and, therefore, does not anticipate that the campus will become publicly accessible in the future.

Reforestation

The Master Plan aims to minimize the disruption of forested areas and stream valleys but roads may need to be realigned and undeveloped land will be required for building footprints. Therefore, some disruption is unavoidable but any loss of trees will be compensated on the site. The Master Plan will adhere to NCPC's Tree Preservation and Replacement Policy and identify areas designated for reforestation (see Table 1-2).

Figure 3-52: Woodlands between MOD 1 and MOD 2 and the BRF sites

Alternative A: Compact Campus; Integrating old and new

Landscape Diagram

1. Secure Welcome Plaza
2. Open / Inviting Arrival
3. Potential Tree Mitigation Area
4. Forested Perimeter Buffer
5. Bioswale Adjacent to Roads & Parking Areas
6. Green Roof
7. Solar Panels
8. Elevated Boardwalk Trail
9. Overlook / Respite
10. Green Wall Adjacent to Parking Garage
11. Micro-Bioretention
12. Flexible Plaza / Courtyard
13. Separated Hike/Bike Facility
14. Potential Underground S.W. Storage
15. Security Fencing
16. Sculpture Opportunities

LEGEND

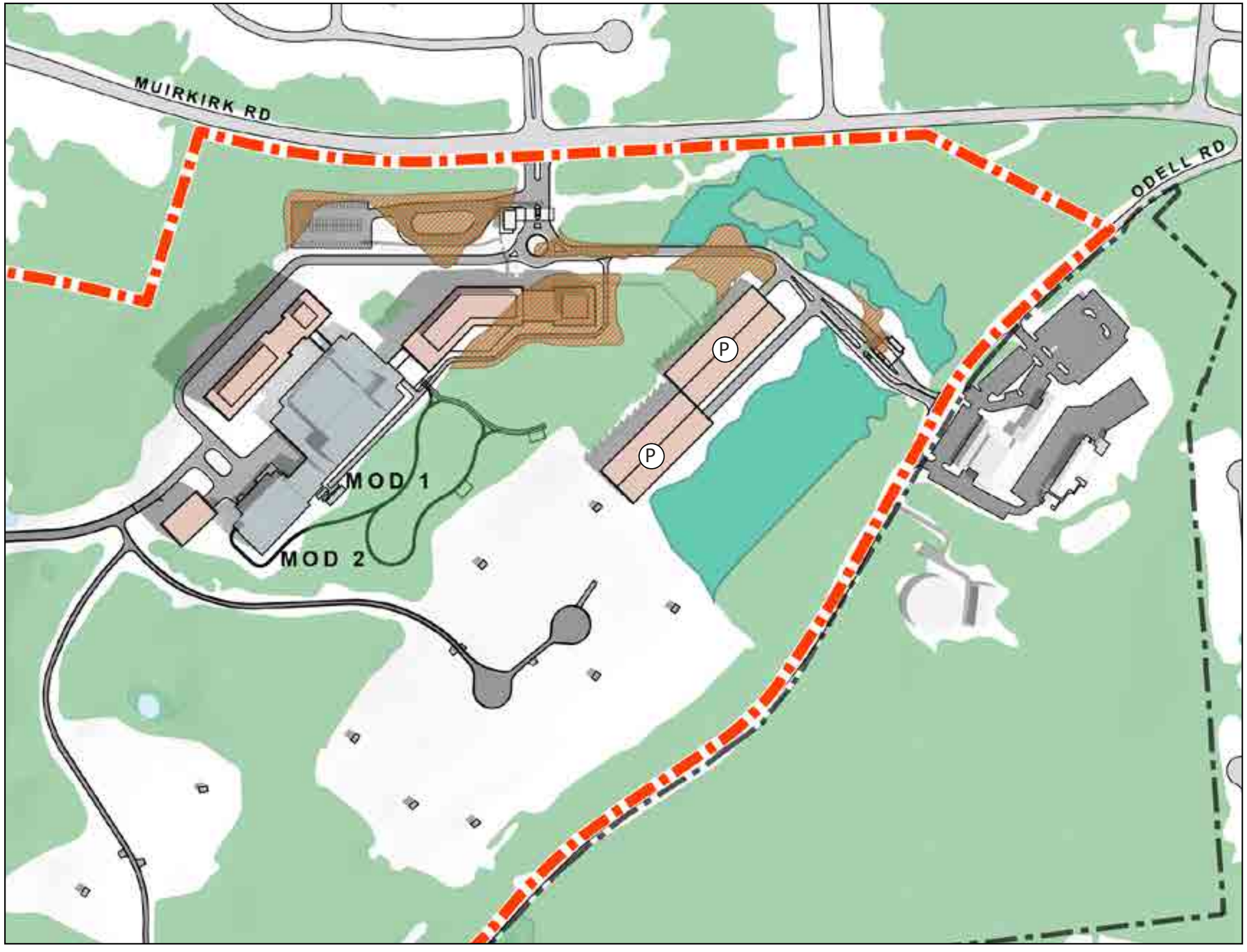
- MRC
- East Parcel
- Existing Buildings
- (P) Parking Structure
- Stream Valley Buffer

0 150 300 600 Feet

Figure 3-53: Alternative A landscape diagram

Alternative A: Compact Campus; Integrating old and new

Tree Replacement Diagram



LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- Parking Structure
- Tree Cover
- Permanent Canopy Impact (4.8 acres)
- Reforested Area (5.4 acres)

0 150 300 600 Feet

Figure 3-54: Alternative A tree replacement diagram

Alternative B: Dual Campus; Distributing development between two sites

Landscape Diagram

1. Secure Welcome Plaza
2. Open / Inviting Arrival
3. Potential Tree Mitigation Area
4. Forested Perimeter Buffer
5. Bioswale Adjacent to Roads & Parking Areas
6. Green Roof
7. Solar Panels
8. Elevated Boardwalk Trail
9. Overlook / Respite
10. Green Wall Adjacent to Parking Garage
11. Micro-Bioretention
12. Flexible Plaza / Courtyard
13. Separated Hike/Bike Facility
14. Potential Underground S.W. Storage
15. Security Fencing
16. Sculpture Opportunities

LEGEND

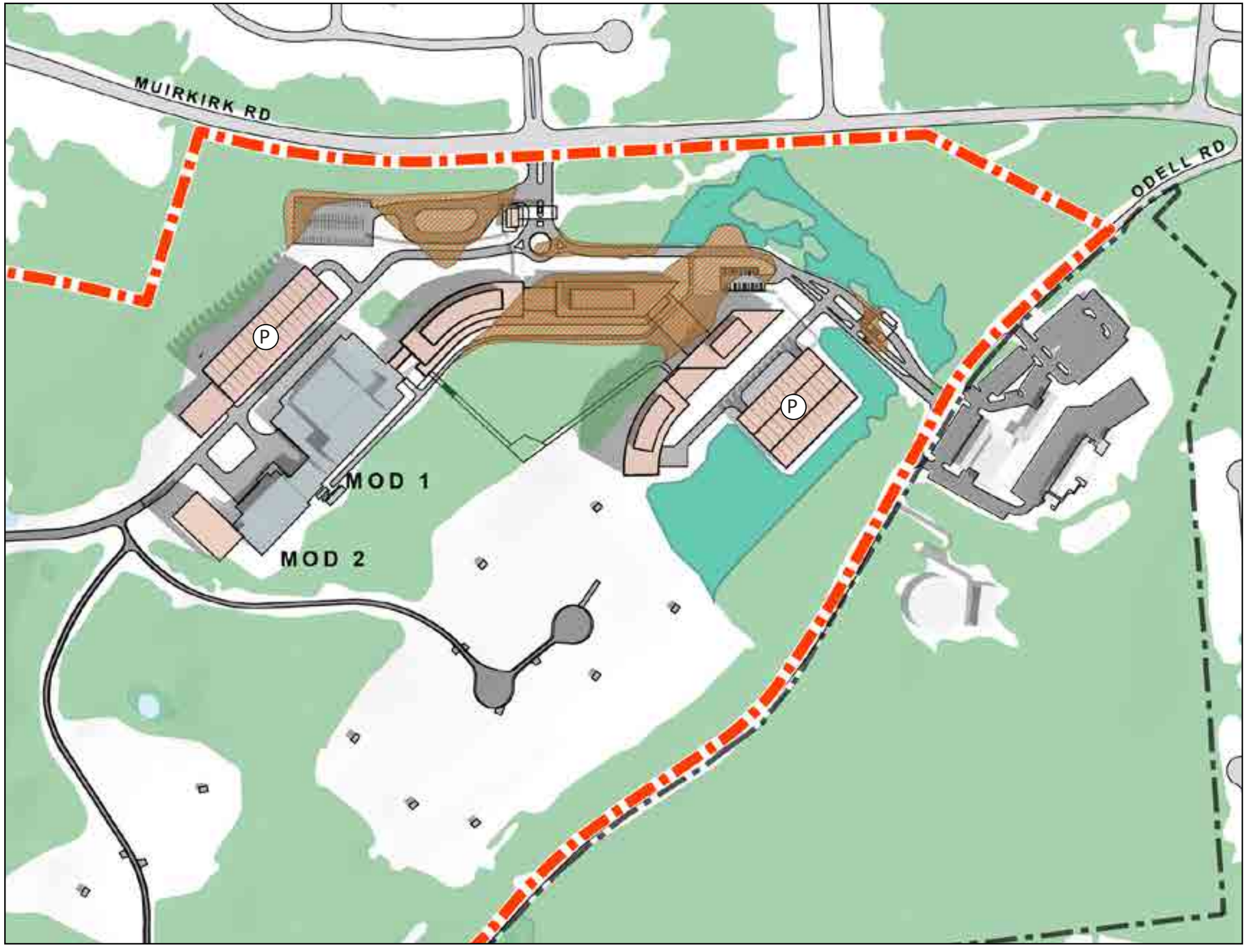
- MRC
- East Parcel
- Existing Buildings
- (P) Parking Structure
- Stream Valley Buffer

0 150 300 600 Feet

Figure 3-55: Alternative B landscape diagram

Alternative B: Dual Campus; Distributing development between two sites

Tree Replacement Diagram



LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- Parking Structure
- Tree Cover
- Permanent Canopy Impact (5.2 acres)
- Reforested Area (5.2 acres)

0 150 300 600 Feet

Figure 3-56: Alternative B tree replacement diagram

Alternative C: Northeast Campus; Reimagining the BRF

Landscape Diagram

1. Secure Welcome Plaza
2. Open / Inviting Arrival
3. Potential Tree Mitigation Area
4. Forested Perimeter Buffer
5. Bioswale Adjacent to Roads & Parking Areas
6. Green Roof
7. Solar Panels
8. Elevated Boardwalk Trail
9. Overlook / Respite
10. Green Wall Adjacent to Parking Garage
11. Micro-Bioretention
12. Flexible Plaza / Courtyard
13. Separated Hike/Bike Facility
14. Potential Underground S.W. Storage
15. Security Fencing
16. Sculpture Opportunities

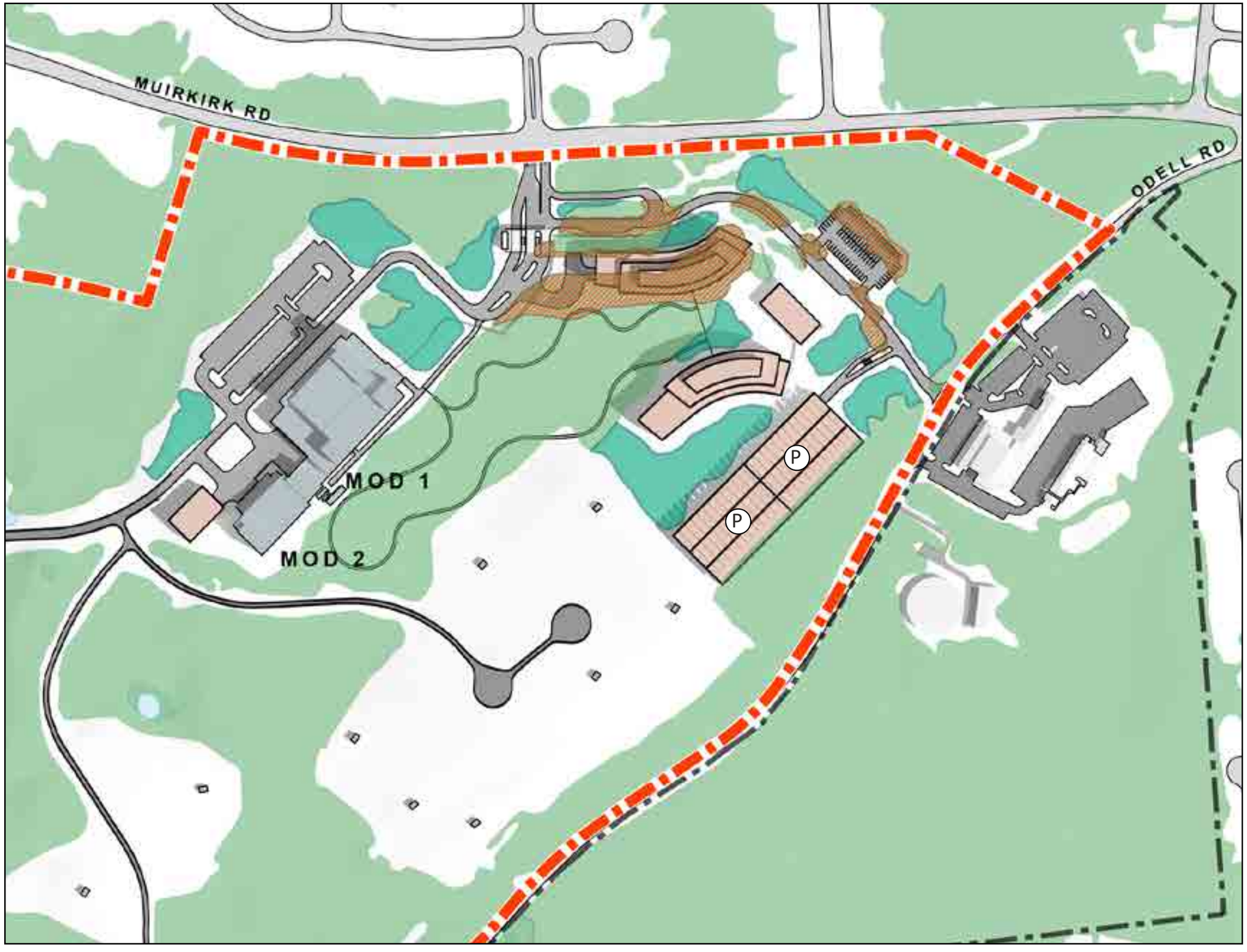
LEGEND

- MRC
- East Parcel
- Existing Buildings
- (P) Parking Structure
- Stream Valley Buffer

0 150 300 600 Feet

Figure 3-57: Alternative C landscape diagram

Tree Replacement Diagram



LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- Parking Structure
- Tree Cover
- Permanent Canopy Impact (4.8 acres)
- Reforested Area (5.3 acres)

0 150 300 600 Feet

Figure 3-58: Alternative C tree replacement diagram

3.9 Parking and Circulation

Existing Campus Users

The primary current users of the MRC are employees of FDA. To determine current commuting patterns and how they might change after the consolidation as part of the TMP, an online survey of existing on-campus employees was conducted. This survey examined the modes by which employees travel to work, working hours, telecommuting, origin/destination, possible improvements to transit options, and reasons for mode choice before the COVID-19 pandemic. The survey results show that most (about 88 percent) of the existing on-campus employees work a typical 5 day/40 hours per week work schedule. In addition, a majority, 68 percent, of employees arrive between 7:00 AM and 9:00 AM and 65 percent depart between 4:00 PM and 6:00 PM.

Existing and Proposed Transportation Access

Regional access to the MRC is provided from I-95, I-295 (Baltimore-Washington Parkway), US-1 (Baltimore Avenue), MD-200, and MD-197 (Laurel Bowie Road). The MRC can be accessed from Muirkirk Road. The nearest MARC station, approximately 1.5 miles from the MRC, is the Muirkirk station. Only one bus route provides service during typical FDA operating hours at one-hour intervals. Due the limited size of the population on this site, FDA does not operate a commuter shuttle route serving local Metro stations. The campus is also too small to warrant an on-campus shuttle service. There are no sidewalks along adjacent roadways and has no pedestrian connections to nearby residential areas.

The site has limited bike accessibility, no on-site bike amenities such as bike lanes, and minimal bike storage. With no bike facilities on the surrounding roadway network, FDA employees are not likely to commute via bicycle. The results of the employee survey show that approximately 97 percent of existing on-campus employees currently commute by driving alone to work. Of the reasons employees prefer to drive alone, a slight majority of respondents (52 percent) said that they prefer the comfort of their own vehicle. Other responses indicated that the lack of transit options to the MRC, especially last-mile connections, was also a factor. Of the 3 percent of campus employees that do not drive alone to work, none of them bicycle or walk to work regularly. No respondents participate in FDA's sponsored carpool and vanpool programs; however, three employees receive commuter benefits such as transit subsidies and guaranteed ride home services. Approximately 22 percent of employees telework only one or two days per week, mostly on Fridays.

Increased Volume Impact

Currently, 300 employees and support staff work at the MRC. The future development will accommodate up to 1,800 employees onsite in two phases. The first phase, which is anticipated to occur in 2026, will add approximately 700 employees to the campus, for a total of 1,000 onsite employees. The full site population of 1,800 employees would be reached by 2040. Trip generation calculations were performed to generate the number of additional AM and PM peak hour trips to the MRC that would be anticipated based on the future land use of the campus as well as employees that are anticipated to telecommute or take transit. The NCPC parking requirements limit the amount of parking that can be provided at the MRC to one space for every two employees. Therefore, it is anticipated that the ratio of employees that telecommute or take transit would increase relative to the reduction in parking supply. A trip distribution analysis then was used to estimate how the new vehicle trips would travel to and from the site using the following established entrance/exit points:

- Virginia Manor Road
- Konterra Drive
- MD 200
- MD 212
- Laurel Bowie Road (MD 197)
- Muirkirk Meadows Drive
- Muirkirk Road
- Old Baltimore Pike
- Powder Mill Road

The results of the capacity analyses show that the addition of 1,500 employees to the MRC would have a moderate adverse impact on traffic conditions at some intersections within the study area. Given the congested nature of the study area corridors, the additional developments in the area, combined with trips generated by the proposed consolidation, mitigation measures would be required. Recommended mitigation measures include signal timing and coordination improvements as well as physical improvements, such as turn lanes and new traffic signals. The traffic impact analysis and mitigation measures are detailed further in the Traffic Impact Study (TIS). Transportation demand management strategies that will be required to accommodate the required parking ratio are detailed further in the TMP.

Planned Onsite Circulation Improvements

Under the Master Plan development, internal roadway modifications and additional security checkpoints will be provided to accommodate the increase in employee activity. The existing security checkpoint off the Muirkirk Road entrance will be enhanced to process a higher volume of vehicles, and the intersection off the main entrance will be improved through widening and a roundabout. Furthermore, a new secured entrance would be provided at Odell Road.

The future MRC will have a fabric of landscaped pedestrian walkways that employees and visitors use to traverse to and from parking garages and between buildings on campus. The proposed Master Plan expands this approach, combining sidewalk and bike connections on the side of the roadway closest to the buildings. In addition, nature paths winding through a central natural landscape area will encourage and support pedestrian use and promote health and wellness.

Alternative Transportation Strategies

Based on the Draft TIS, signal timing and coordination enhancements at all signalized intersections as well as additional physical improvements at select intersections are also recommended as part of a mitigation strategy that attempts to reduce and mitigate the impact of peak hour vehicle trips on the external roadway network. Additionally, the TMP presents several enhancements that are recommended to provide better connections for alternative modes, such as transit, pedestrians, and bicyclists. These recommendations include:

- Provide a 14-foot multi-use path along one side of the campus roads, separated from the roadway by a linear bioswale.
- Connect the multi-use path to future pedestrian and bicycle facilities on the external roadway network.
- Provide secure, covered bicycle parking near building entrances.
- Construct a new transit hub that provides a climate-controlled waiting area with amenities, such as benches, wi-fi, and real-time transit information.
- Work with Prince George's County to enhance pedestrian and bicycle connections to nearby residential and commercial centers, as well as to regional pedestrian/bicycle path networks.
- Work with WMATA, RTA, and MTA to provide enhanced transit connections to and from the MRC and nearby MARC and Metrorail stations. If not feasible, FDA should consider operating a shuttle.
- Work with other nearby agencies and campuses to coordinate Traffic Demand Management (TDM) measures, such as shuttles to nearby MARC and Metrorail stations.

Parking Ratio

The Master Plan increases the number of FDA employees and support staff up to 1,800 in phases. To accommodate growth, approximately 435,000 gsf of additional building space and a total of 980 employee and visitor parking spaces is proposed. The parking equates to a parking ratio of 1:2, or approximately one parking space for every 2 employees. Currently, all parking at the MRC is surface parking. The parking lots are located adjacent to the office and lab space. The largest parking lot is located west of MOD 1 and MOD 2. The Master Plan assumes that most of the future parking will be provided in garages. The walking distance and conditions will need to be considered. The design of buildings and landscape should include features that provide shade and shelter pedestrians from

the elements. Parking spaces would be permitted for employees and support staff. However, some additional parking is needed for visitors. Thus, 980 parking spaces are recommended in the Master Plan.

Based on information contained in the employee commuter survey, approximately 97 percent of existing on-campus employees drive alone to work, while 86 percent of employees at leased locations are anticipated to drive alone to work if they are relocated to the MRC. Therefore, substantial transportation demand management strategies will be required to help reduce parking demand and meet the 1:2 parking ratio. As required by NCPC, a TMP has been prepared to recommend strategies that FDA can use to reduce the single occupancy vehicle trips to the site and encourage increased vehicle occupancy and alternative modes of transportation. The TMP provides a variety of policy, service, and infrastructure strategies, which are anticipated to reduce single-occupancy vehicle trips to and from the campus. This will also help to mitigate the impacts to the surrounding transportation network.

Truck Screening & Emergency Access

Currently, trucks must access the site through the main entrance at Muirkirk Road. Trucks pass through the security checkpoint at the gate and use the internal roads to get to their destination on the campus. The loading docks for MOD 1 and MOD 2 are combined at the back of MOD 1 and connected to MOD 2. There is a separate loading dock for the BRF. Truck entry into the Animal Research Facility is restricted to authorized vehicles only and there are two secondary entry points with gates and security checkpoints. One is located just south of MOD 2 that can be reached from the northern campus and one is off Odell Road just south of the intersection with Springfield Road. At the secondary gate at Odell Road, trucks are screened at a quarantine building.

In two of the three Action Alternatives, A and B, the truck access would be located at Odell Road, across from the MD Army National Guard complex and truck screening would be separate from the screening of employees and visitors. The truck screening facility would be located at the Odell entry point. In Alternative C, trucks would access the campus from the main entrance at Muirkirk Road and be screened upon entering the site.

In all three Action Alternatives, trucks entering the Animal Research Facility will continue to be screened at the existing secondary gates.

The Master Plan assumes that the internal service road which leads from the second entry at Odell Road near the quarantine buildings and runs through the Animal Research Facility and pastures and connects to the gate south of MOD 2, will function as emergency access in the future. This will require an upgrade of this internal road in the future.

3.10 Relationship to FDA White Oak Campus

The proposed expansion at the MRC is part of a larger effort to consolidate FDA's operations. Most of FDA's operations have been consolidated on its White Oak campus at the FRC. Today, FDA occupies 130 acres of the FRC's 670 acres. The 2018 FDA White Oak Master Plan supports up to 18,000 employees. The Master Plan for FDA's White Oak campus at the FRC has established the overarching design guidelines for other FDA campuses, including the MRC. There are key parallels and differences between the MRC and FDA White Oak campus at the FRC that are relevant with respect to design. The defining feature of the White Oak campus is a commons and a series of smaller courtyards. Taken together, these open spaces create a university-like campus. With 197 acres and a future staff level of 1,800, the MRC has a much smaller population (about 10 percent of the White Oak campus population) but a significantly larger site.

Much of the MRC is characterized by open pastures that support the CVM and undeveloped woodlands. The new development is concentrated adjacent to MOD 1 and MOD 2 and the BRF, away from the pastures due to the sensitive nature of animal research. For the MRC, the Master Plan aims to maintain and embrace the natural setting. The defining feature for the Master Plan is not a manmade space but the wooded stream valley adjacent to MOD 1 and MOD 2. This bowl-shaped landscape element is covered by a relatively young forest and is considered a crucial amenity for the future. The Action Alternatives all embrace this as a focal point. Future buildings are oriented toward the woodlands and anticipate using this feature as a place to retreat or socialize while preserving the natural habitat (see Figure 3-53, 3-55 and 3-57).

The key parallels between the FRC and the MRC are FDA's unified mission and consistent workplace strategy. The Master Plan presents an opportunity to create a regional identity for FDA that assimilates characteristics from their headquarters at White Oak and CFSAN in College Park while recognizing the unique woodlands setting of the MRC. The predominant material that defines the buildings at the FRC is brick masonry, which reinforces the collegiate-like setting (see Figure 3-59, and 3-61). The brick masonry is coupled with the use of metal panels and glass in the architecture of laboratories to emphasize FDA as a leading-edge scientific institute (see Figure 3-60). With MOD 1 and MOD 2 clad in brick masonry compatible to the FRC, there is the beginning of a regional identity. Like at the FRC, there is the need to reinforce the identity of the MRC as a modern research facility. Like at the FRC, the architecture at the MRC should connote a sense of spontaneity and delight. Unlike the FRC, the woodlands setting at the MRC suggests the use of more natural materials. Since the completion of the FRC Master Plan, building codes have changed, and construction technologies have advanced. They now support the use of mass timber construction for new buildings proposed in the Master Plan. The benefits of using mass timber are a reduced carbon footprint and a natural look and feel creating a warm, rich environment.

Figure 3-59: FDA White Oak campus at FRC

Figure 3-60: Brick masonry at White Oak campus

Figure 3-61: FDA White Oak campus at FRC

3.11 Design Guiding Federal Elements

The design guidelines and sustainability features for the MRC need to align with the policies of the Comprehensive Plan for the National Capital. For the purposes of the Master Plan, we will reference the Summary of Policies of the Federal Elements, effective April 5, 2016.

Most relevant are the following sections:
1. Urban Design, Section C, specifically:
• Sub-section C.1 which promotes inspiring design of campuses and individual buildings,
• Sub-section C.2 which promotes integration with the surroundings, and
• Sub-section C.3 which promotes integration of security into the campus site planning and building design.

2. Workplace, for which all sections are relevant, as this element promotes the modernization, repair, and rehabilitation of an existing federally owned facility instead of developing new facilities, and to create a master plan to guide the long-range development of installations where more than one principal building, structure, or activity is located or proposed,

3. Transportation, Sections C and D, specifically:
• Sub-section C.2, which refers to development on Federal Facilities,
• Sub-section D.1, which refers to Transportation Management Plans (TMPs),
• Sub-section D.2, which refers to Federal Facilities in suburban areas, and
• Sub-section D.3, which refers to visitor parking.

4. Federal Environment, for which almost all sections are relevant as they refer to the EIS as part of NEPA compliance.

5. Parks and Open Space, Section B, specifically Sub-section B.2 as it concerns natural resources.

3.11.1 Urban Design Element

Inspiring Campus Design

The Master Plan anticipates construction of new buildings for FDA and the design should reflect the following specific goals:
• emphasize the importance of this institution in the National Capital Region, constructed with high-quality, durable materials to protect the public investment,
• promote FDA as a forward-looking scientific federal institution of significant stature, inspiring dignity, and permanence,
• find ways to create an FDA regional identity that assimilates characteristics from their headquarters at White Oak and the CFSAN in College Park, while recognizing the unique woodlands setting of the MRC,
• pursue sustainable design, respect the woodland setting, and evaluate the potential use of mass timber construction to reduce the carbon footprint and create a warm, rich campus environment (see Figure 3-62),
• celebrate FDA as a leading scientific institution with the use of innovative building technology and materials, like the eye-catching and beautifully designed steel connections used for mass timber construction (see Figure 3-63),
• complement, simultaneously, the existing masonry buildings on the MRC,
• knit the material together to create a cohesive expression, similar to the FRC, optimize building orientation and articulation to enhance daylighting, views and minimize solar gain in the summer,
• install native or adaptive landscape plantings that celebrate the local ecology, support a variety of enduring exterior amenity spaces, and function as an integral part of the stormwater management and building security strategies (see Figure 3-64 and 3-65), and
• design support functions at the MRC, such as security checkpoints, canopies, storage and staging facilities, and services corridors, in a way that compliments and strengthens the overall campus design strategy.

Figure 3-62: FDA FRC campus

Figure 3-63: Steel connections used for mass timber construction

Proposed Planting Areas - Native / Adaptive Species Examples

The use of native or adaptive species is an important element in the overall development of the campus. Native species should be utilized for their ability to thrive in existing soil and climate conditions, and their natural resistance to insects and diseases. Use of native species also supports a healthy ecology. Further, native plants define landscapes that reflect the natural character and ecological history of place. This results in a more authentic and engaging sense of place for the employees and visitors.

Proposed species examples shown here are only a sample of available species at local nurseries and growers. The final planting design should consider “right plant right place” best practices and select from readily available lists of native and adaptive species including: the Maryland Cooperative Extension, MDNR, USFWS, Prince George’s County, and M-NCPPC.

Grasses / Groundcover / Vine

Sorghastrum nutans / Indiangrass

Carex stricta / Tussock Sedge

Chrysogonum virginianum / Green-and-gold

Parthenocissus quinquefolia / Virginia Creeper

Shrubs / Ornamental Trees

Spiraea alba / Narrow-leaved Meadow-sweet

Viburnum acerifolium / Maple-leaved Arrowwood

Hamamelis virginiana / Witch Hazel

Viburnum prunifolium / Black Haw

Shade & Street Trees

Sassafras albidum / Sassafras

Acer rubrum / Red Maple

Betula nigra / River Birch

Liriodendron tulipifera / Tulip Poplar

Figure 3-64: Examples of native/adaptive species

Reforested & Mitigation Areas - Native / Adaptive Species Examples

Reforested and Tree mitigation areas should utilize hardwood species identified in the site tree survey. Additional other native species should be incorporated where appropriate to enhance biodiversity. Understory species should be selected with caution to prevent spreading, and only utilized when erosion control measures are required.

Nyssa sylvatica / Black Gum

Quercus alba / White Oak

Prunus serotina / Black Cherry

Liquidambar styraciflua / Sweet Gum

Fraxinus americana / White Ash

Liriodendron tulipifera / Tulip Poplar

Carya glabra / Pignut Hickory

Pinus taeda / Loblolly pine

Acer negundo / Box Elder

Figure 3-65: Examples of native/adaptive species

The Master Plan provides the urban design framework for building groupings, massing, and architectural character, streetscape, landscape elements and character, signage, and parking. The design should:
• group the buildings on the northern portion of the campus and new buildings should, to the extend possible, be built within the areas of the campus that already are developed, specifically at the sites of MOD 1 and MOD 2 and the BRF,
• keep the massing of new buildings consistent with the existing buildings, specifically MOD 1 and MOD 2 and the height of new buildings should respect the tree line and maintain the perimeter landscape buffer,
• respect the architecture of the existing buildings while introducing innovative materials and sustainable technologies to achieve the highest energy efficiency and reduce the carbon footprint for any new buildings,
• enhance the natural character of the campus and integrate the natural features into the campus design, configuration of the internal road network and the campus landscape,
• strengthen the green and low-density character of the campus as a research facility,
• take an approach to way-finding and signage on the campus that is consistent with the directional signage and graphic treatment at the White Oak campus and other FDA campuses (see Figure 3-66), and
• design new parking facilities to the same standards as on other FDA campuses and integrate sustainable features like green walls and rooftops that are designed, as much as possible, to capture and retain rainwater, reduce the heat island effect, and generate renewable energy (see Figure 3-109 and 3-110).

Generally, the design should implement sustainable site and building design at a district-level scale, where possible. The building design should:
• achieve a balance between iconic design and infill design as appropriate to the building site's location and setting,
• integrate the accessibility to transit, bicycle, and pedestrian modes into the urban design, and
• comply with ADA and ABAAS requirements.

Integrating the MRC into the Surrounding Community

The site planning of the MRC relates appropriately to the surrounding context and considers the rural-suburban setting, surrounding open landscape and the relatively small scale of the residential communities to the north and west of the campus.

The Master Plan maintains a 100-foot landscape buffer at the site perimeter. This landscape buffer is even wider, namely 300-foot, along the western campus boundary where the residential properties at Ellington Drive abut the MRC. The building mass is set back even further from the outer perimeter of the campus to minimize the visual impact on the surrounding community.

The Master Plan enhances the pedestrian experience on and around the campus, to the extent possible given the security requirements on the site. The Master Plan includes flexible and impervious areas, creates an open space amenity accessible to the employees and introduces new plazas to accommodate social interaction. The design should:
• avoid blank walls where a building meets the plazas and open space amenity, and
• activate facades that face the internal roads, especially at the main entrance, by installing art displays, using transparent materials, or deploying other appropriate methods.

The MRC incorporates common open areas and aims to design pedestrian and vehicular entrances and physical gateways to the campus and individual buildings to be as inviting and accessible as possible.

Urban Design and Security at the MRC

The Master Plan aims to minimize the need for hardening of building site features by integrating the perimeter security into the topography of the site to provide physical perimeter security where feasible. The Master Plan identifies landscape features to be hardened, particularly through the placement of anti-ram barriers at the main entrance and along the main campus roads in a manner that minimizes their visual impact and physical infringement into the public realm.

An inner-perimeter fence will function as the physical perimeter security element located at the edge of the building yards. The fence designs should accommodate visual and physical access to the common outdoor areas, including designated entries into the plazas and the open space amenity.

Generally, the location of perimeter security barriers should minimize interruption of pedestrian circulation. The placement of security barriers should incorporate best design practices and industry standards and be arranged to:
• comply with the ABA and ABAAS,
• provide visual clues to signify important circulation routes and site or building features,
• provide sufficient clearances to allow access to and from transit stops,
• provide safe pedestrian access to and along sidewalks, plazas, and the open space amenity, and building entrances,
• provide emergency access to buildings and design for the event of emergency evacuation from buildings,
• ensure that maintenance equipment such as snowplows, utility trucks, and motorized cleaners can access and maneuver within building yards, sidewalks, and plazas, and
• provide at least two feet from the face of the curb to the face of the barrier to allow for opening car doors, unloading, and loading of passengers, and ease of access to plazas and the open space amenity.

The design of security barriers, including their mass, form, and materials should respond to the architectural and landscape context in which they are located as well as complement and aesthetically enhance the character of the MRC.

Physical perimeter security barriers within the MRC should be incorporated into the landscape design and include low walls, ha-ha, boulders, swales, berms, fences, seating, landscaping, and walkways. The design of these barriers should be architecturally compatible with adjacent buildings and respect the overall character of the campus (see Figure 3-111).

The design of perimeter security should respect the role, significance, and location of the MRC in the community as well as established view corridors and the perimeter security design should:
• strive for continuity, consistency, and enhancement of the overall landscape,
• avoid relying on repetitive use of single elements, such as continuous rows of bollards or planters,
• follow design principles to achieve a sense of openness, balance, rhythm, and hierarchy that will improve wayfinding and visual linkages along a street and enhance the pedestrian experience. For example, elements can be designed and placed to signify pedestrian entrances into buildings, plazas, and the open space amenity, and
• treat security barriers as a family of beautiful, functional landscape elements that also function as an amenity for employees and visitors.

3.11.2 Workplace Element

The Master Plan meets the policies related to locating federal work as it concerns the modernization, repair, and rehabilitation of an existing federally owned facility instead of developing new facilities. The Master Plan considers the proximity of the MRC to transit and compatibility with local planning efforts.

Additionally, the Master Plan meets the policies related to developing and managing federal workplaces because it will:
• locate, design, construct, and operate the MRC to minimize total energy use,
• continue to provide and maintain safe and healthy working conditions at the MRC,
• create a campus that engenders a sense of pride, purpose, and dedication for employees and agency missions,
• encourage employees to use non-motorized modes and multi-occupant modes of travel including rideshare, carpools, vanpools, and public transportation to get to/from work, and
• guide the long-range development of installations where more than one principal building, structure, or activity is located or proposed.
Lastly, the Master Plan meets the policies related to reuse of federal space and land as it utilizes available

Wayfinding and Signage

The wayfinding and signage for the MRC will need to use the standards developed for FDA White Oak Campus at the FRC. See also FDA Consolidation Sign Master Plan, January 15, 2010.

Figure 3-66 shows a sample of banners, directional signage, building and garage identification.

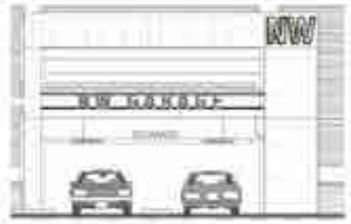
BA.1 Site Banner

SI.1 Site Identity

VD.1 Vehicular Directional

VD.2 Vehicular Directional

BI.1 Building Identification



GI.1 Garage Identification

TR.1 Traffic Regulatory

Figure 3-66: FDA Consolidation Sign Master Plan prepared for FRC at White Oak, MD

federally owned space and land before purchasing or leasing additional land or building space. The MRC is a federal facility with 300 employees and concerns more than 100,000 sf and therefore the Master Plan needs to consider strategies to minimize adverse social, economic, and environmental impacts on the Prince George's County, the City of Laurel, and the surrounding residential communities, and to mitigate the impact of relocating federal employees.

3.11.3 Transportation Element

Guiding Principles for Transportation

The Transportation Element is guided by the following principles:

- Advancement of an interconnected transportation system that meets regional planning goals and objectives
- Integration of a range of equitable mobility options to improve transportation access throughout the region
- Connection of transportation and land use to encourage responsible development patterns

Section C.2. of the Transportation Element is most relevant to the MRC as the Master Plan concerns development on federal facilities. The site should be designed to:

- provide access and connections to the local and regional transportation system, as appropriate, and minimize disruptions that result from security measures,
- ensure transportation improvements are compatible with the existing transportation network and available services in the surrounding area,
- consider the surrounding context, including view corridors, or any applicable design guidelines, in determining the design, layout, scale, and materials of streetscape features,
- assess impacts of new development on the transportation system and provide mitigation to ensure that the system functions adequately when projects are completed, with an emphasis on multimodal solutions,
- provide a system of dedicated, inter-connected trails, protected bike lanes, and sidewalks, for pedestrians and other micro-mobility options, among the MRC entrance points and all on-site buildings,
- integrate green infrastructure measures into roadways, bike paths and walkways to meet sustainability goals,
- support compact development with connected walking, bicycle, shuttle/transit infrastructure and wayfinding on the MRC so users can easily and comfortably travel between on-site destinations,
- prioritize parking structures over surface parking,
- locate parking structures in a way that considers efficient land use and good urban design,
- treat surface parking lots in an environmentally sensitive manner using features such as permeable pavers, bioswales, green roofs over covered parking, and/or solar panels (see Figure 3-108),
- place parking structure in a way that is sensitive to the surrounding context and provide opportunities for integrating other uses or adaptable reuse, where possible,
- remove surface parking lots, when no longer needed, and convert to open space, or use for new development, and
- locate parking facilities so they do not obstruct pedestrian or bicycle access to buildings and minimize their visibility from surrounding public rights-of-way.

The strategy for transportation and parking, including employee and visitor parking, is summarized in Chapter 4 of the Master Plan Report.

Transportation Management Plans

As the MRC is a federal facility owned by FDA, FDA is required to prepare a TMP that encourages a multimodal transportation system that:

- meets the needs of workers, residents, and visitors, while improving regional mobility, transportation access, and environmental quality, and
- helps agencies meet NCPC parking ratio policies and reduce SOV travel.

FDA will develop an integrated Transportation Demand Management Program as part of the TMP which is designed to:

- reduce impacts on regional congestion, improve environmental quality, and minimize parking demand, and
- continue to monitor existing transportation demand management programs and transportation metrics, including the commute mode split for the facility.

Workplace Parking

Following the Transportation Element's area designation for workplace parking, the MRC is considered a "Suburban Area Beyond Metrorail". This means that the parking ratio should not exceed one space for every two employees (1:2).

To meet the policies for workplace parking, the Master Plan should:

- provide priority parking spaces in convenient locations for high-occupancy and energy-efficient vehicles to improve sustainability,
- locate dedicated parking spaces for employees with ability impairments in locations that connect to the shortest accessible route to building entrances,
- limit parking for temporary users conducting official business at a given federal workplace, these spaces are exempted from the installation's employee/parking ratio (1:2)
- provide limited parking spaces for fleet or operational vehicles as needed to meet mission requirements, these spaces are exempted from the installation's employee/parking ratio (1:2),
- minimize adverse impacts of transportation decisions on adjacent communities including spillover parking and congestion, and
- consider charging employees for agency provided parking or treating agency provided parking as a taxable benefit to the extent permitted by law as a transportation demand tool to reduce overall SOV travel.

Visitor Parking

The MRC is not considered a visitor destination and therefore FDA only needs to provide sufficient parking for visitors of FDA facilities on the site. For work-related visitor parking, no ratio is set. FDA will need to consult the parking policies of local jurisdictions to determine appropriate parking standards. Absent clear local guidance, FDA should determine appropriate parking ratios consistent with other comparable regional standards or industry best practices.

3.11.4 Federal Environment Element

The Federal Environment Element addresses climate change impacts in long-range plans, site selection, and capital projects. This means that the Master Plan needs to consider, among others, the effects of:

- risk of flooding (sea level rise, annual rainfall, intensity of rainfall),
- pollutant levels in runoff,
- soil erosion,
- increased stormwater runoff,
- temperature extremes,
- increased number and severity of storms such as hurricanes,
- impact to tree viability and vegetation, and
- critical services and infrastructure reliability.

Generally, the Master Plan needs to be consistent with agency, local, and regional climate adaptation and mitigation plans by:

- prioritizing capital investments that are climate resilient and will increase the region's adaptive capacity,
- coordinating climate adaptation actions with other federal, regional, and local agencies within the same geographic area,
- ensuring that federal actions do not create greater climate change vulnerabilities in local communities or the region, and
- considering the long-term vulnerability of a community's critical infrastructure to climate change risks during the site-selection process.

The climate adaptation and mitigation plans, specifically for air quality, water resources and stormwater, floodplains, wetlands, soils, tree canopies and vegetation, wildlife, waste, light, noise, and energy are summarized in Chapter 4 of the Master Plan Report.

Air Quality

Section B of the Federal Environment Element identifies policies related to air quality. The Master Plan needs to:

- use green building materials, construction methods, and building designs to promote safe indoor air quality,

• take measures to temporarily reduce the generation of emissions that contribute to ozone formation in response to Ozone Action Days when the highest ozone levels occur,
• take measures to plan long-term for reduction of mobile and stationary sources, and

Stormwater Management

Section C identifies policies related to water resources and stormwater management. The Master Plan needs to develop a stormwater management plan that:
• facilitates collaboration between federal agencies and local jurisdictions to develop a stormwater management plan, and
• approaches stormwater management at a campus or district-level.

The stormwater management strategies are summarized in Chapter 4 of the Master Plan Report.

Flood Protection

Section D identifies the policies related to flood protection. FDA will need to collaborate with federal and regional agencies on flood management plans and flood protection projects, specifically to:
• prohibit hazardous activities and critical actions in floodplain areas,
• encourage modification of existing developments to remove or mitigate flood hazards, restore floodplain values, and improve water management, and
• discourage investment in floodplain areas unless related to correcting flood hazards or restoring floodplain values.

Wetland Protection

The Master Plan should protect the physical and ecological functions of the wetlands and riparian areas on the campus with priority in the following order as described in Section E of the Federal Environment Element, specifically to:
• avoid development of areas that contain wetlands, including isolated wetlands, or on sites that will impact the quality and health of nearby wetlands,
• minimize the impacts to wetlands by reducing the area of disturbances. If construction in a wetland is necessary, utilize the highest standard in project development requirements to minimize adverse impacts, and
• replace wetlands that are lost or degraded resulting from site development.

Soils

The Master Plan discourages development in areas of identified high erosion potential as described in Section F of the Federal Environment Element. The site planning and design should specifically:
• discourage development on slopes with a gradient of 15 percent and above, and on severely eroded soils, and excessive slopes (25 percent and above),
• employ best management practices to reduce the potential for soil erosion and the transportation of sediment, consistent with state and local requirements,
• limit uses on highly unstable soils to passive recreation, conservation areas, and open space,
• locate and design buildings to be sensitive to natural groundwater flows,
• avoid development in areas where mineral resources, such as diabase clay and shale, are located,
• identify and protect soil protection zones,
• create and implement an erosion and sedimentation control plan during construction to prevent damage or loss of critical soils,
• avoid soil compaction in design of landscape plans, during construction, and maintenance,
• minimize tree cutting and other vegetation removal to support soil structure (slope geometry, location, and geologic content), reduce soil disturbance, and limit erosion, and
• enhance degraded soils during significant building or site improvements.

When tree removal is necessary, FDA should replace trees, shrubs, and other vegetation to prevent a net vegetation loss.

Tree Canopy and Vegetation

Section G concerns policies related to tree canopy and vegetation and are designed to preserve and protect existing trees, especially individual trees, stands, and forests of healthy, native, or non-invasive species. The Master Plan accounts for existing trees early in the planning and design process and aims to maximize preservation and incorporate the natural landscape into the design.

Specifically, trees 31.85-inches in diameter (100 inches in circumference) or greater may not be removed, unless removal is critical to FDA's operations and planning/design alternatives that would preserve such tree(s) has been explored and determined incapable of accommodating program requirements, or the tree(s) are considered invasive, hazardous, or high risk per an Arborist's evaluation. In general, all possible considerations should be taken to preserve and protect trees in areas determined to be critical to the health of tributary streams and watersheds, and on sites with old growth forests and/or with significant ecosystems.

The Master Plan will indicate where to transplant or replace existing tree(s) when they are impacted by development and preservation is not feasible, according to procedures described in Section G of the Federal Environment Element which are to:
• transplant healthy, native, or non-invasive tree(s) where practicable,
• replace tree(s) when they require removal with trees that increase biodiversity, are native species or non-invasive species, and have a mature canopy spread equivalent to, or greater than, the tree(s) removed,
• locate replacement or transplanted tree(s) on the project site, the property where the project site is located or another site within FDA's jurisdiction,
• ensure the amount of planting soil volume is consistent with current industry best practices,
• protect tree(s) to be preserved in accordance with the most current edition of ANSI A300, and
• transplant, install, and maintain trees also in accordance with the most current edition of ANSI-A300, and specify replacement trees in accordance with the most current edition of ANSI-Z60.1.

In general, the Master Plan seeks to conserve tree canopy coverage and enhance the environmental quality of the National Capital Region by preserving existing trees, replacing trees where they have died, and transplanting or replacing trees where they require removal due to development to prevent a net loss of tree canopy in the development area and:
• incorporate new trees and vegetation into plans and projects to absorb carbon dioxide, moderate temperatures, minimize energy consumption, reduce pollution, and mitigate stormwater runoff. This includes the use of vegetation in the design and development of green roof projects where feasible and consistent with local regulations,
• conserve plant communities native to the site's ecoregion (as defined by the Council on Environmental Quality),
• protect and/or restore areas containing native plant communities, and provide habitat corridors connecting to off-site natural areas or buffers adjacent to off-site natural areas for migrating wildlife,
• maintain and preserve woodlands adjacent to waterways, especially to aid in the control of erosion, sediment, and thermal pollution,
• encourage the use of native plant species and remove invasive plants where appropriate, protect and preserve all vegetation designated as special status plants,
• use vegetation to minimize building heating and cooling requirements,
• use trees and other vegetation to offset emissions of greenhouse gases from operations,
• plant and maintain trees and other vegetation to achieve long-term storage of carbon dioxide following accepted protocols that ensure offsets are permanent and verifiable,
• support sustainable practices in landscape design, and
• limit the use of grass species as lawn to recreational areas so that major reductions in water, chemicals, maintenance, energy, air, and water pollution, and noise occur.
The results of the tree delineation survey that was conducted as part of the master planning effort are summarized in Chapter 4 of the Master Plan Report.

Wildlife

The Master Plan encourages facility design and landscaping practices that provide food and cover for native wildlife as intended by Section H of the Federal Environment Elements. The Master Plan:

- discourages development or significant alteration of areas used by wildlife, including migratory wildlife,
- considers the impacts, including cumulative impacts, of environmental changes on wildlife habitats and the biodiversity of an ecosystem, and
- avoids actions that could have significant long-term adverse effects on aquatic habitats, such as dredging and filling operations that disrupt and destroy organisms.

To protect native wildlife, the Master Plan:

- uses buffer areas to transition the intensity of uses (active uses, passive uses, and conservation areas) from development to wildlife functions,
- designs the site to avoid habitat fragmentation and allows movement through barriers (such as roadways and fences),
- leaves streams untouched to ensure undisturbed habitat for species movement, and
- maintains existing natural vegetated corridors and other wildlife habitat.

The results of the wildlife survey conducted as part of the master planning effort are summarized in Chapter 1, subchapter 1.8.4.

Solid Waste and Hazardous Waste

The Master Plan seeks to ensure responsible solid and hazardous waste management as identified in Section I of the Federal Environment Element. The design should specify:

- reuse or recycle salvaged building and organic materials to conserve resources and divert materials from landfills and incinerators,
- use of products containing recycled content,
- waste reduction measures that extend the life of waste disposal systems and reduce energy demand, including recycling programs, composting, and utilizing biodegradable products,
- ways to monitor and conduct periodic testing to detect and avoid leaks or spills from structures that hold hazardous materials (underground storage tanks, pipes, and retention areas), and remediate groundwater contaminations, and
- ways to manage and dispose of hazardous wastes and toxic substances in a safe manner in accordance with national, state, and local regulations.

FDA will develop an environmental management system for the MRC to understand and manage the facility's environmental risks and hazards. The design of future development on the site will need to meet the requirements of the environmental management system.

Light Pollution

The Master Plan includes measures to reduce levels of light pollution as identified in Section J of the Federal Environment Element. The lighting design of buildings and landscape should:

- minimize excess light and glare,
- eliminate upward and horizontal spillage,
- allow for operations that use lighting only when needed, and at appropriate light levels-
- minimize maintenance, reduces energy use, and provides better visibility,
- evaluate exterior lights for their effectiveness, maintenance requirements, and energy use and allow for the light to be switched off when possible, and
- consider IES's (Illuminating Engineering Society) BUG rating system when selecting exterior landscape lighting. Fixture Backlight (B), Luminaire Uplight (U), and Nighttime Glare (G) should be minimized and exceed all local and regional codes.

Noise Pollution

The Master Plan aims to minimize noise pollution as identified in Section K of the Federal Environment Element. The design of buildings and landscape should:

- avoid locating activities that produce excessive noise near sensitive natural resources and land uses such as residential areas and major civic destinations,
- locate, design, and construct improvements to roads, driveways, loading docks, and parking lots in a manner that is sensitive to existing adjacent land uses,
- ensure that construction activities comply with local noise ordinances, and coordinate with local governments and adjacent communities to establish limits on the intensity and hours of noise generation, and
- use low noise equipment, sound proofing technology, or install noise barriers to reduce the impact of noise from mechanical equipment or from everyday operations and activities.

Energy

The Master Plan aims to improve environmental performance as identified in Section L of the Federal Environment Element, specifically to installation of photovoltaics on the rooftops of parking structures and surface parking lots. The design of building and landscape should:

- reduce fossil fuel-generated energy consumption by 55 percent compared to an FY 2003 baseline for new and renovation projects as required under the law consistent with EISA, with designs for new buildings or major renovations begun in FY 2030,
- provide at least 30 percent of hot water demand in new or renovated federal buildings from solar hot water heating if life-cycle cost-effective,
- locate and construct the new buildings to minimize energy loss in long-distance energy transmission, and
- pursue energy conservation strategies at a multi-building or district-level.

3.11.5 Parks and Open Space Element

Particularly Section B of the Parks and Open Space Element of the Federal Elements is relevant to the Master Plan. This section focuses on stewardship of natural resources. The landscape design should protect and improve the condition of the natural terrain and its features including the streams, their associated valleys and the forested areas and other ecologically significant features. Generally, the landscape design should:

- protect, and where necessary restore, the natural landscapes, wetlands, steep slopes, mature/healthy trees, and understory vegetation, floodplains, woodlands, and highly permeable soils,
- protect and preserve the terrain features, stream valleys and forested natural areas so they continue to serve as valuable resources to FDA employees, and
- preserve and maintain trees, vegetation, natural areas, and open space on the campus that support wildlife habitats, improve scenic quality, and enhance aesthetic character.

Preservation of these spaces should be compatible with FDA's mission and programmatic needs.

3.12 Climate Effects

3.12.1 Impact of Climate on Design

Weather File

As the project is in Laurel, Maryland, the closest Typical Meteorological Year (TMY) weather file for building simulations and future proofing is from Reagan Washington Airport (USA_VA_Arlington Reagan.Washington.Natl.AP.724050_TMYx.2004-2018). TMY is a widely used type of data that is considered the standard for building simulation and prediction. TMYs contain one year of hourly data that best represents median weather conditions over a multiyear period. Although a TMY can be thought of as a median, the methods used to calculate it consider many factors beyond a simple calculation of median values, including solar resource data and weather data such as wind speed and ambient temperature. TMY files provide the most accurate representation of climate in a specific location.

Climate Summary

Temperature
- Warmest month: July
- Maximum annual temperature: 97°F (May)

Coldest month: January
- Min annual temperature: 13°F (February)

Moisture and humidity
- Mean relative humidity: 62 percent

Wind
- Annual mean speed: 12 feet per second
- Wind patterns: South prevailing winds

Precipitation
- Annual rainfall: 40.8 inches
- Driest month: October (3 inches of rainfall)
- Wettest month: August (3.9 inches of rainfall)

Solar energy
- Mean daily global radiation: 1,304 Btu/sf
- Annual solar resource: 477 kBtu/sf annually
- Annual mean cloud cover: 70 percent

Sun path
The sun path diagram shows the position of the sun over the whole year. The sun will have the most impact on the south façade. On the north facade will receive sun in the summer only after 4 pm and before 8 am (see Figure 3-67).

Dry Bulb Temperatures
Warmest temperatures are from mid-May to mid-September from 8 am to 8 pm (see Figure 3-68).

Solar Radiation/Global
Figure 3-69 shows the availability of solar radiation. Highest values are from April to mid-September, from 9 am to 4 pm.

Solar Radiation/Direct
Figure 3-70 shows direct solar radiation. Higher values mean clearer skies.

Solar Radiation/Diffuse
Figure 3-71 shows diffuse solar radiation. Higher values mean cloudier skies.

Overall, values of direct solar radiation are higher than diffuse solar radiation. This will have a higher impact on the directionality of solar radiation and impact on facades. Solar geometry will have a bigger impact on the facade.

Relative Humidity
The average relative humidity in Washington, DC, is 62 percent, however this value is misleading because it varies considerably between night and day. It can go up to 90 percent during the night and below 30 percent during the afternoon. Lowest relative humidity is during the afternoon (see Figure 3-72).

Cloud Cover
Annual mean cloud cover is 70 percent (see Figure 3-73).

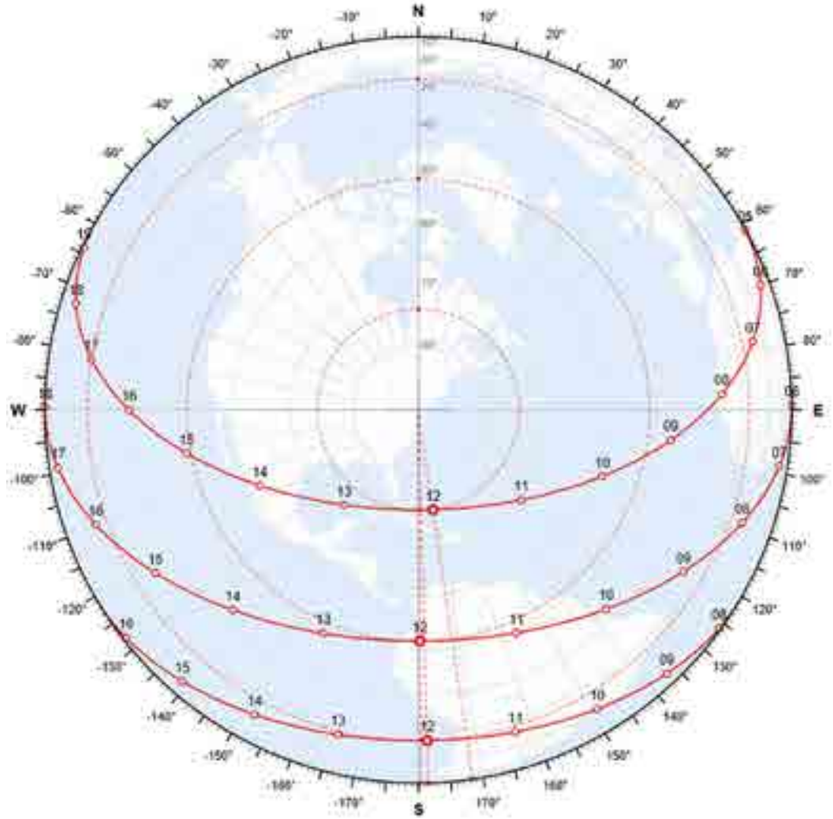


Figure 3-67: Sun path diagram

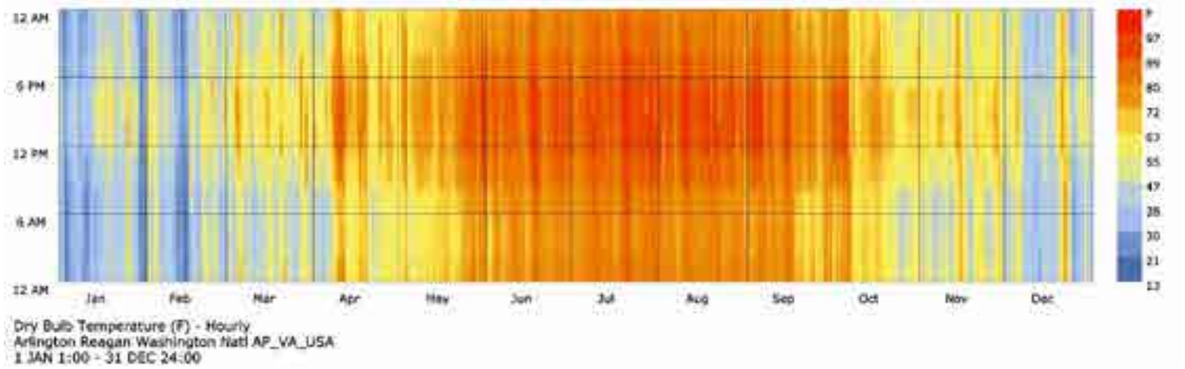


Figure 3-68: Dry bulb temperatures

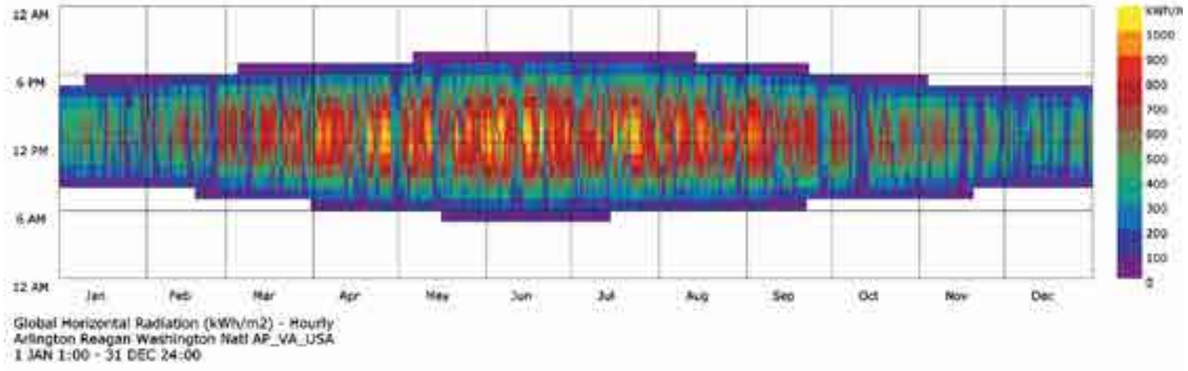


Figure 3-69: Solar radiation/global

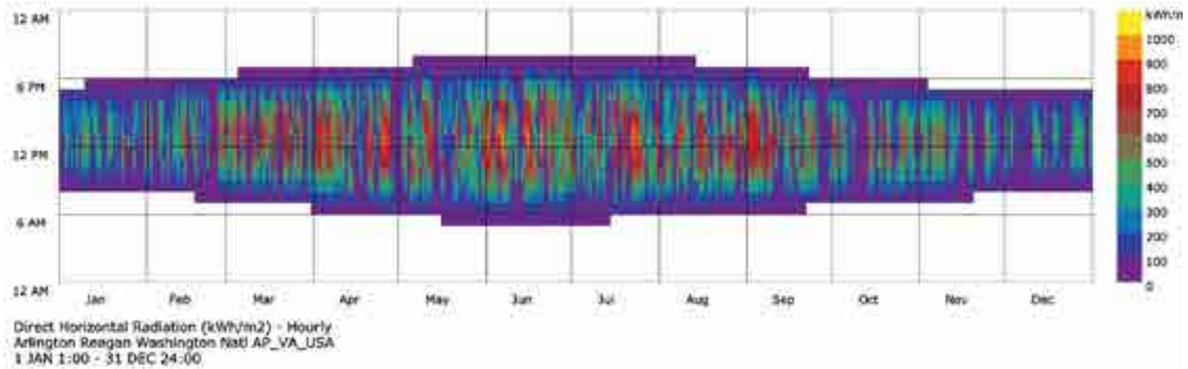


Figure 3-70: Solar radiation/direct

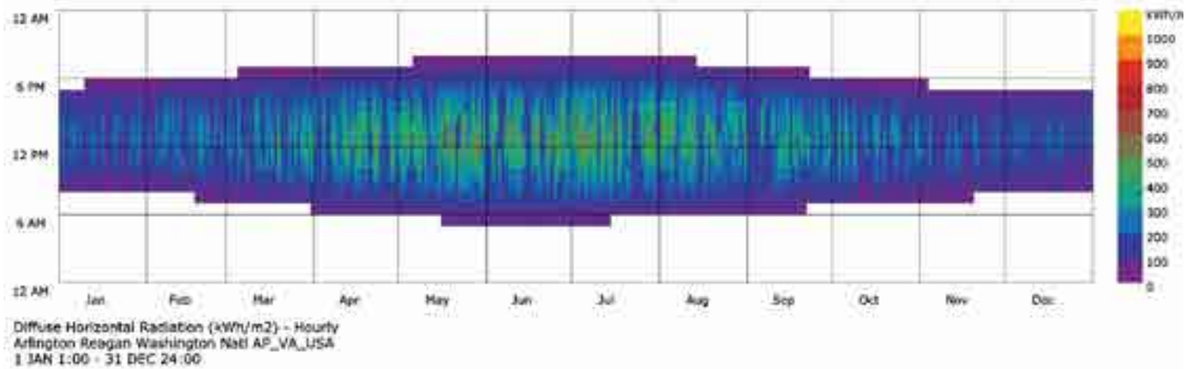


Figure 3-71: Solar radiation/diffuse

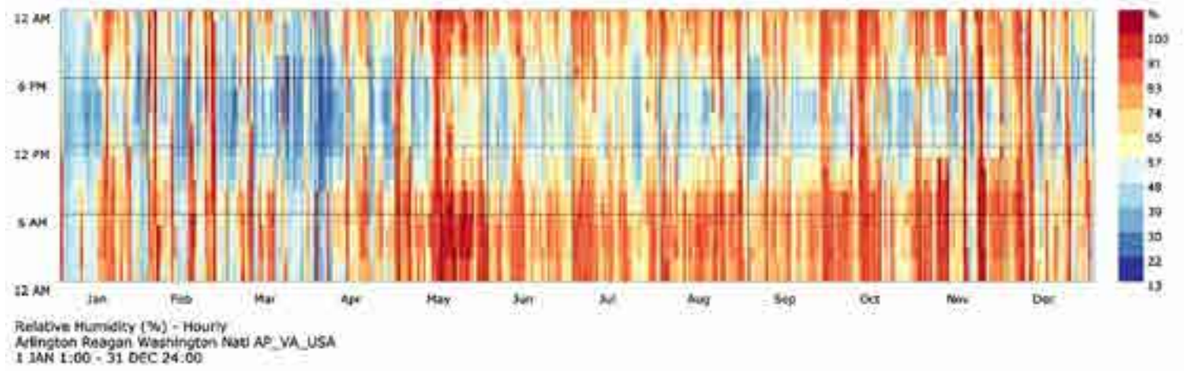


Figure 3-72: Relative humidity

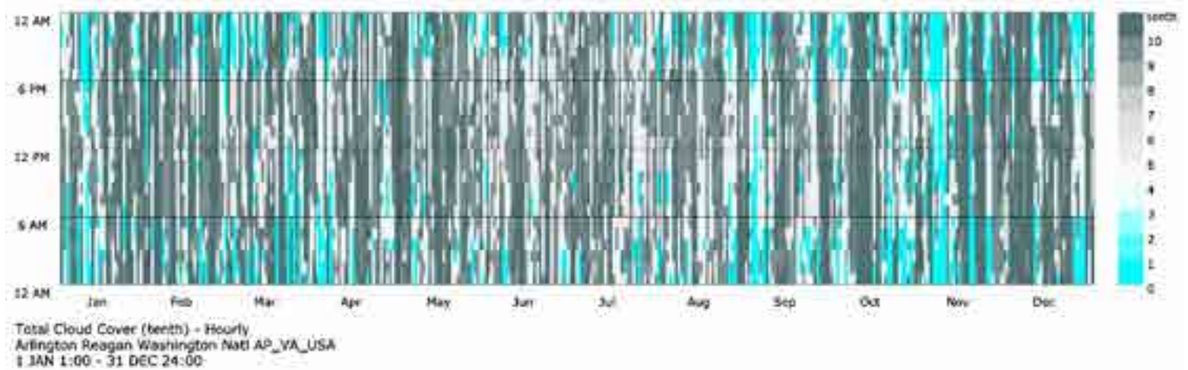


Figure 3-73: Cloud cover

Wind Roses
Figure 3-74 shows the wind rose diagrams for the site.

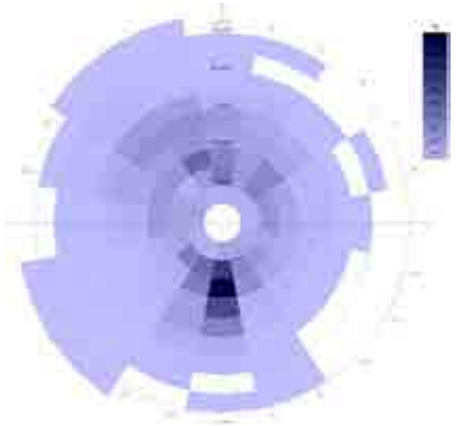
3.12.2 Effect of Climate on Outdoor Spaces

The impact of solar radiation on thermal comfort can be significant if a surface receives solar radiation and the occupant is exposed to these surfaces. Reducing solar radiation on the surface significantly reduces the negative effect of the surface on thermal comfort in a warm climate.

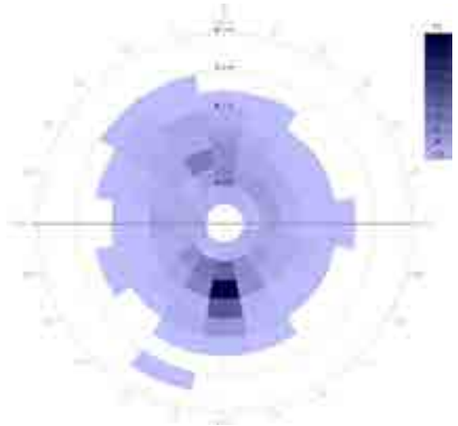
Thermal comfort is affected by several factors that affect the rate of heat dissipation from the body and are usually classified as environmental or personal factors. The environmental factors are air temperature, radiation, air motion, and relative humidity, and the personal factors are the activity level and the clothing level.

Figure 3-75 integrates the results of several climate variables to represent thermal stress. Cooler months are from November to March. Comfortable months are April and October, and overheated months are May to September. Thermal stress helps to determine the strategies needed for the design of outdoor space. In general, outdoor spaces need to be protected from the wind and open to the sun from November to March and shaded from the sun and open to the wind from May to September.

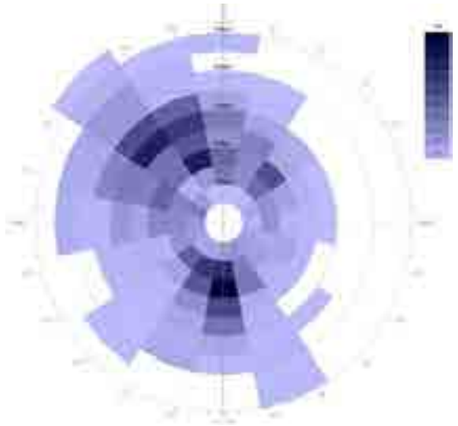
Shadow studies are a simple way to define the impact of solar radiation on a site which affects thermal comfort. Thus, shadow studies help understand the usability of the outdoor spaces during the different seasons. There will be more potential to use a space in the summer if it is shaded while there is more potential to use sunnier spaces in the winter. The shadow study for December 21 will be during the cool period, June 21 will be in the warm period, March 21 in the cool period and September 21 in the warm period.



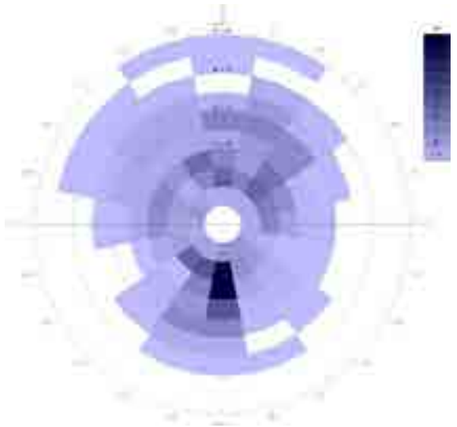
Annual wind rose



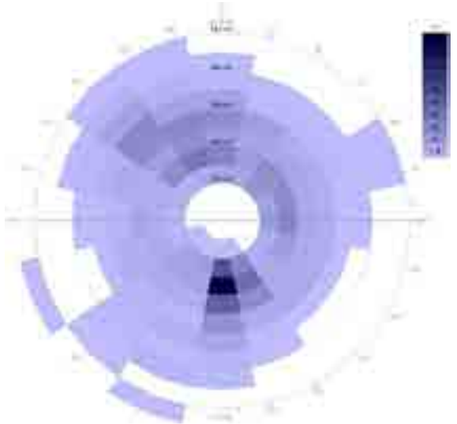
Summer wind rose



Winter wind rose



Fall wind rose



Spring wind rose

Figure 3-74: Wind rose diagrams (annual and seasonal)

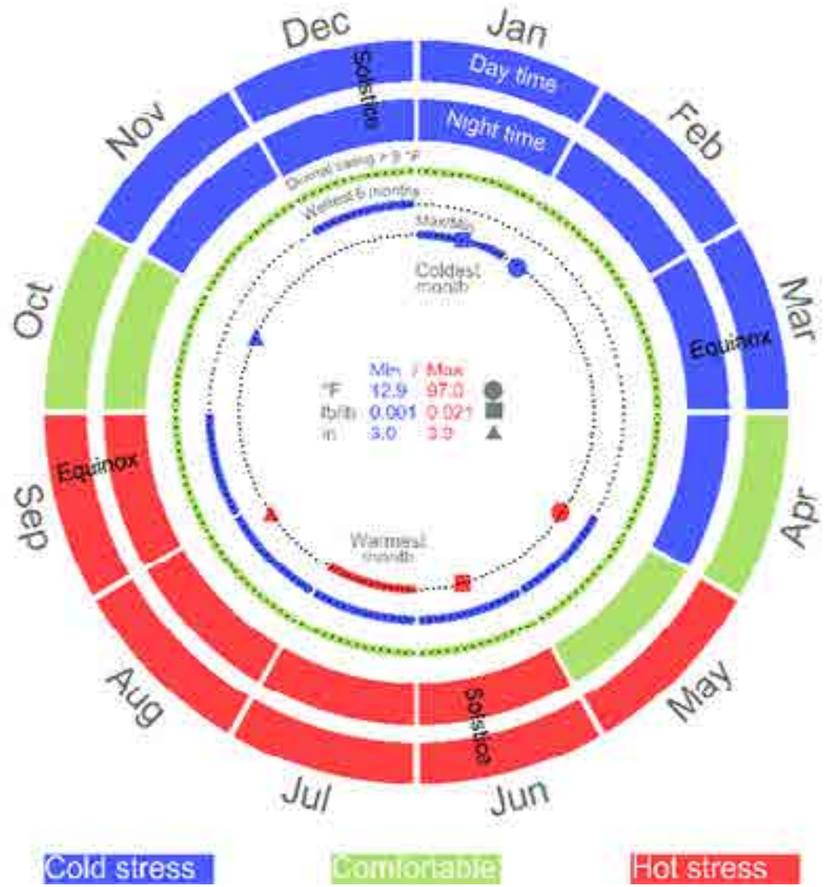


Figure 3-75: Thermal stress diagram

Alternative A: Compact Campus; Integrating old and new

Light and Shadow Study

The anticipated impacts on light and shadow are depicted in the diagrams for various times and seasons.

Figure 3-76 shows that the West Plaza is the sunniest outdoor space in the winter around noontime. In spring when sun is also helpful to achieve thermal comfort, this space will also be comfortable for longer periods of time because shadows will be shorter. It is important also to block winter winds from the south and northwest in the winter. Including in the design of this outdoor space shaded areas that allow for air flow under them at the occupant level, especially from the south would make the spaces more comfortable in the summer. During the summer, forested areas will at least be partially shaded by the trees.

Figure 3-76: Alternative A West Plaza

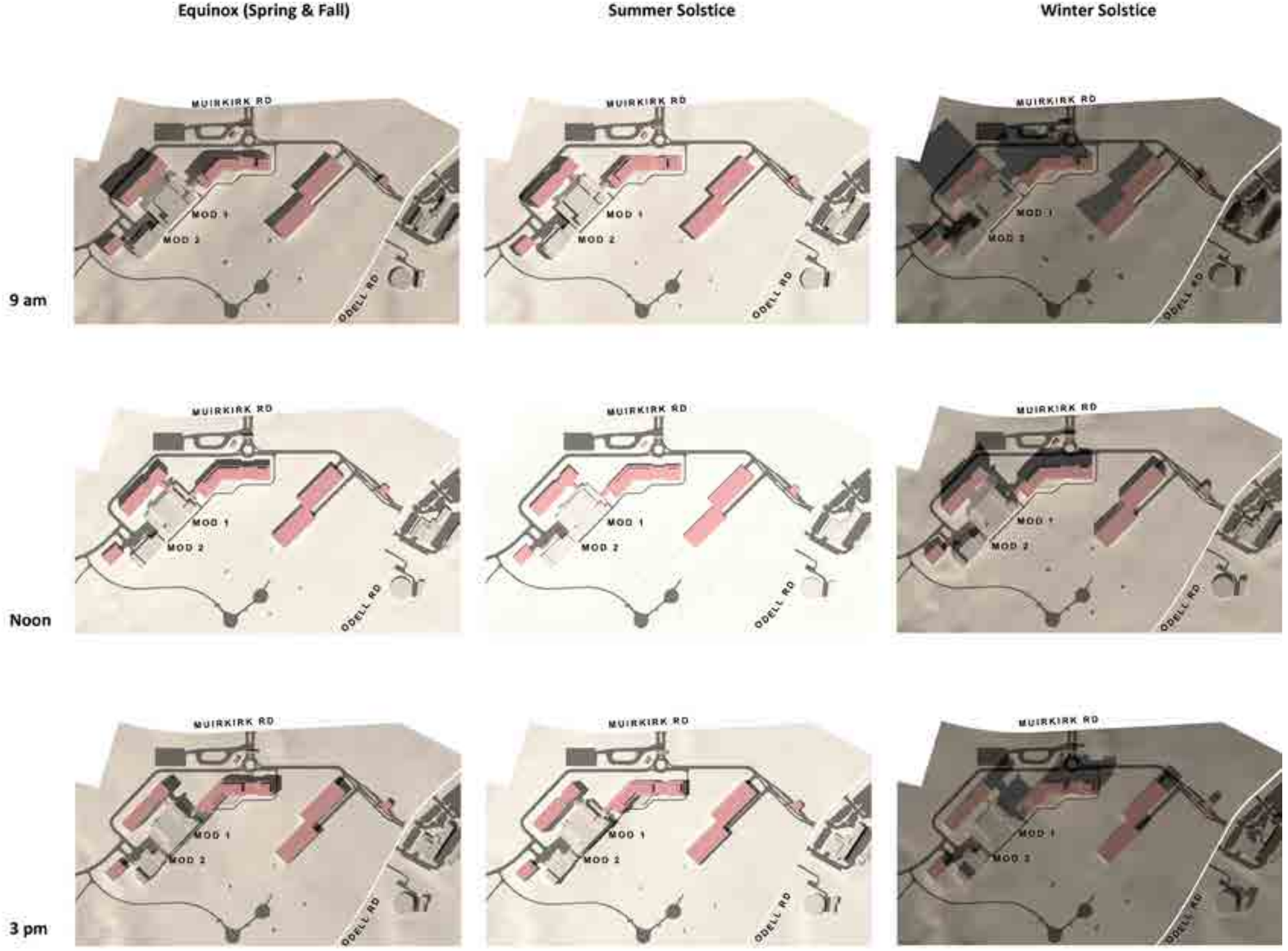


Figure 3-77: Alternative A shadow study

Alternative B: Dual Campus; Distributing development between two sites

Light and Shadow Study

The anticipated impacts on light and shadow are depicted in the diagrams for various times and seasons.

Figure 3-78 shows that the West Plaza is the sunniest outdoor area during the winter, but only close to noon time. In spring when sun is also helpful to achieve thermal comfort, this space will also be comfortable for longer periods of time because shadows will be shorter. Including in the design of this outdoor space shaded areas that allow for air flow under them at the occupant level, especially from the south would make the spaces more comfortable in the summer.

During the summer, forested areas will at least be partially shaded by the trees.

Figure 3-78: Alternative B West Plaza

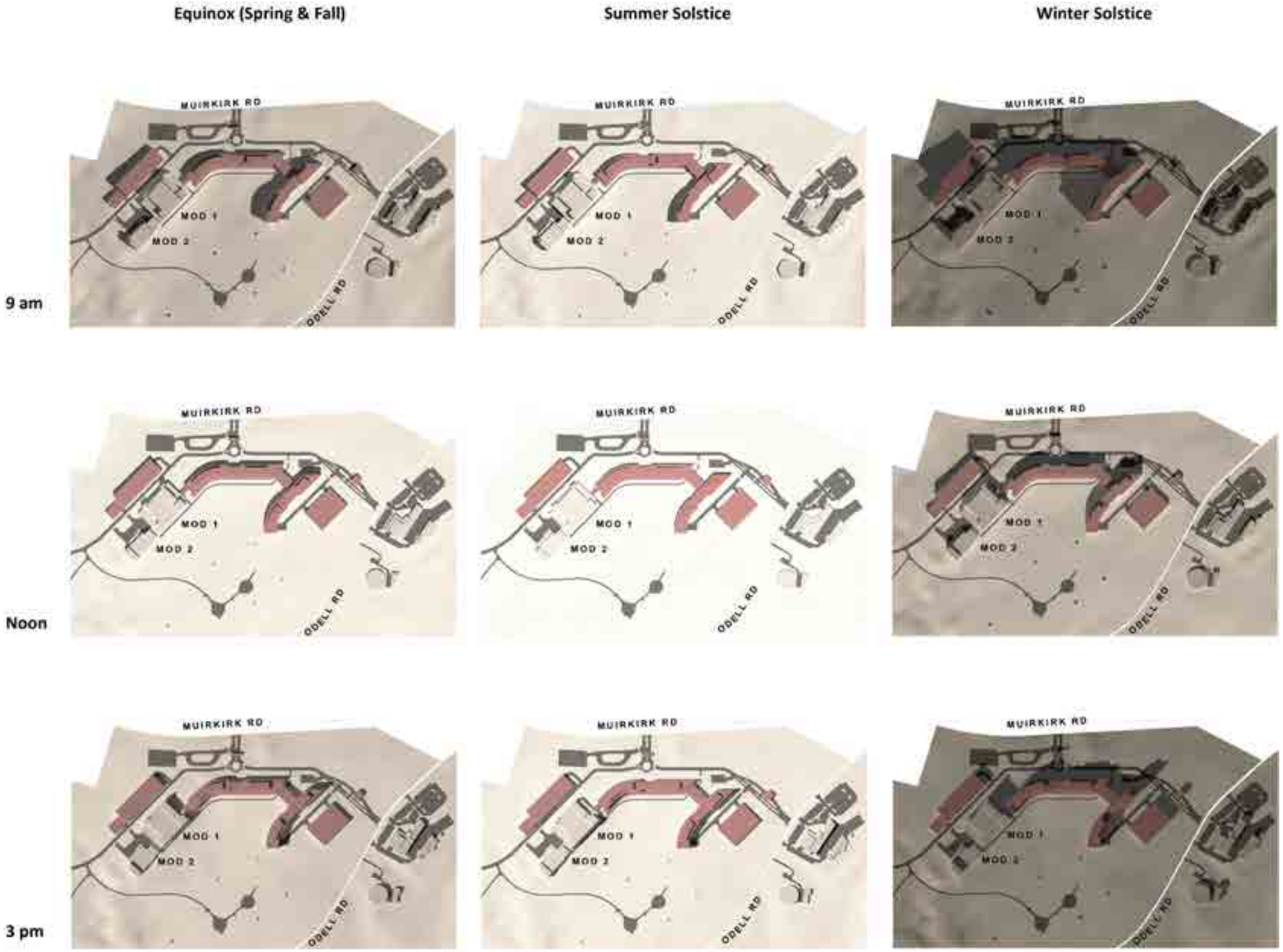


Figure 3-79: Alternative B shadow study

Alternative C: Northeast Campus; Reimagining the BRF

Light and Shadow Study

The anticipated impacts on light and shadow are depicted in the diagrams for various times and seasons.

Alternative C has the disadvantage of shading the East Plaza as shown in Figure 3-80, the new outdoor space to the north of the new building at the BRF in the winter.

However, the West Plaza, as shown in Figure 3-80, will be a sunny and more comfortable outdoor space in the winter. It will receive sun during most of the day and should have landscaping strategies to reduce wind velocity. Shaded areas that allow for air flow would make the spaces more comfortable in the summer.

During the summer, forested areas will at least be partially shaded by the trees.

Figure 3-80: Alternative C East and West Plaza

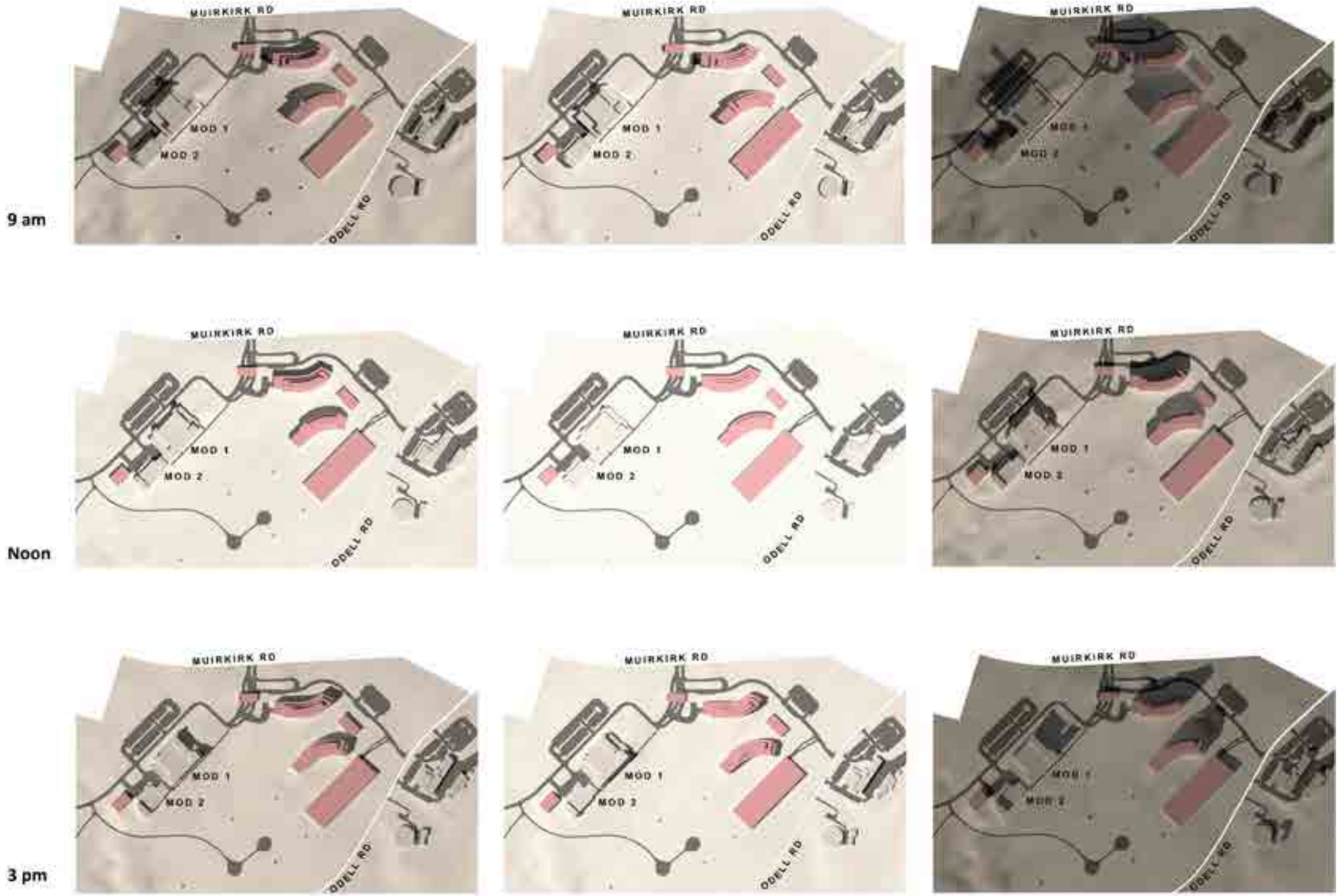


Figure 3-81: Alternative C shadow study

3.12.3 Effect of Climate on Building Design

Climate affects building design in different ways, especially the envelope. This section shows some of the effects of climate on building design. The findings of the solar studies are high-level. To draw more detailed conclusions from the solar studies would require more quantification. For example, by comparing the three Action Alternatives to determine which of the alternatives has the most area of south facing façade and the least west facing facades as this would, relatively speaking, be the preferable alternative from a solar gain perspective.

Heating Required

Heating is required 48 percent of the time from November to March, when temperature is below 60°F. This heating can be supplied by mechanical systems or passive systems. A solar study of the different options in December 21 indicates which building surfaces receive most solar radiation and are most beneficial (see Figure 3-82).

Natural Ventilation Potential

Figure 3-83 indicates opportunities for natural ventilation to provide indoor comfort when temperatures are between 61 and 71°F, which is about 14 percent of the year. During this time, it is possible to naturally ventilate the building. This can be done through operable windows or economizer cooling of the mechanical system.

Building Shading/Requirements

Under warmer temperatures, heat gains from the exterior should be reduced to limit cooling loads and improve thermal comfort. Figure 3-84 shows hours in which temperatures are above 70°F and in which shade will be helpful to achieve this reduction of heat gains to the interior. Temperatures above 70°F are most likely to occur from mid-May to mid-September (35 percent of the year) but can also occur at some days in October. External shading devices should be designed to provide shade on building facades during this period, especially on facades that will receive most solar radiation as identified in the solar studies.

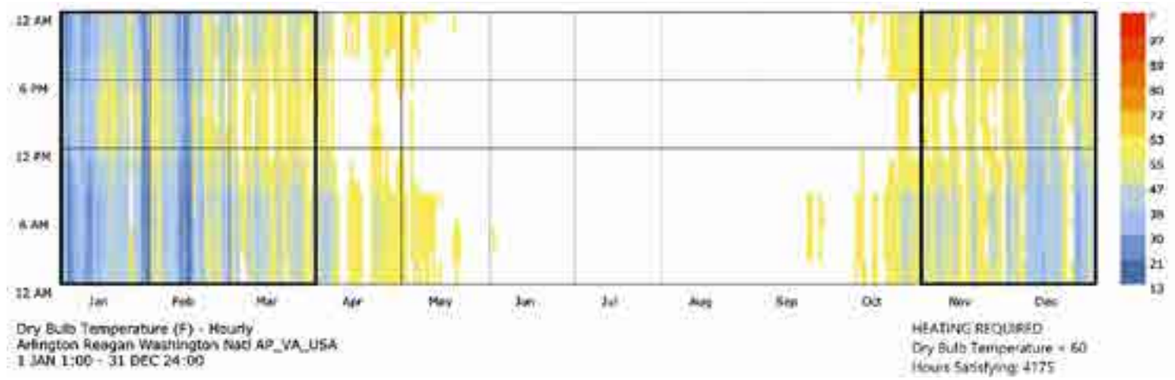


Figure 3-82: Heating required

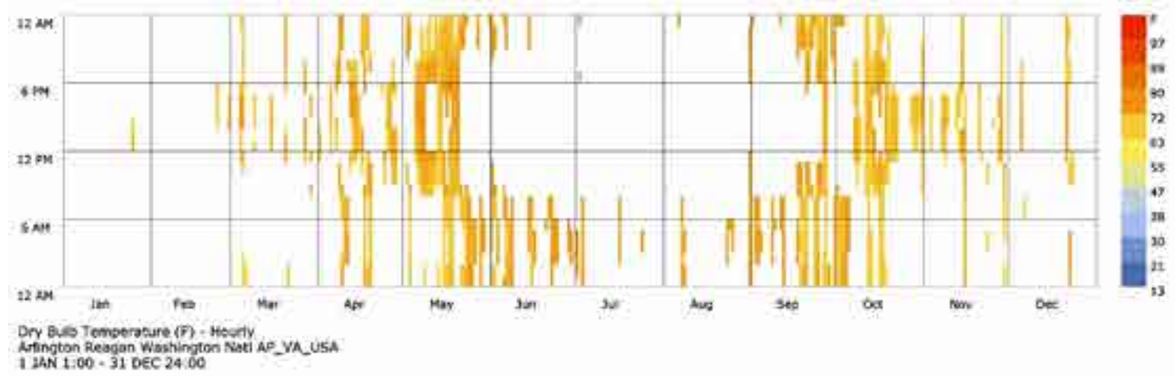


Figure 3-83: Natural ventilation potential

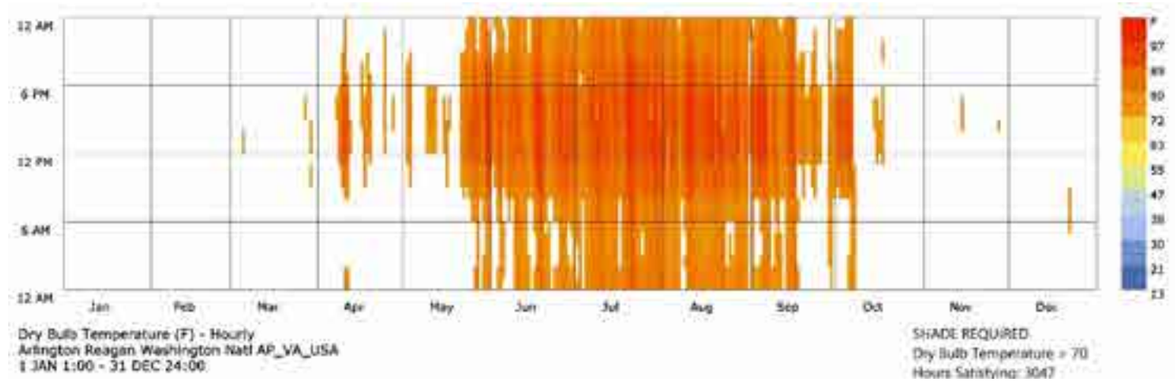


Figure 3-84: Building shading/requirements

Overlapping the temperatures with solar radiation indicates when shade is needed most. Highest solar radiation values are from 9 am to 4 pm, from April to mid-September. Highest temperatures are from 8 am to 8 pm from mid-May to mid-September. Overlaying these values shows the requirements for shade, when there is maximum heat with maximum solar radiation, from mid-May to mid-September from 9 am to 4 pm.

A solar study of the envelope in June 21 indicates which building surfaces receive most solar radiation and are most critical, requiring more shade during the summer period.

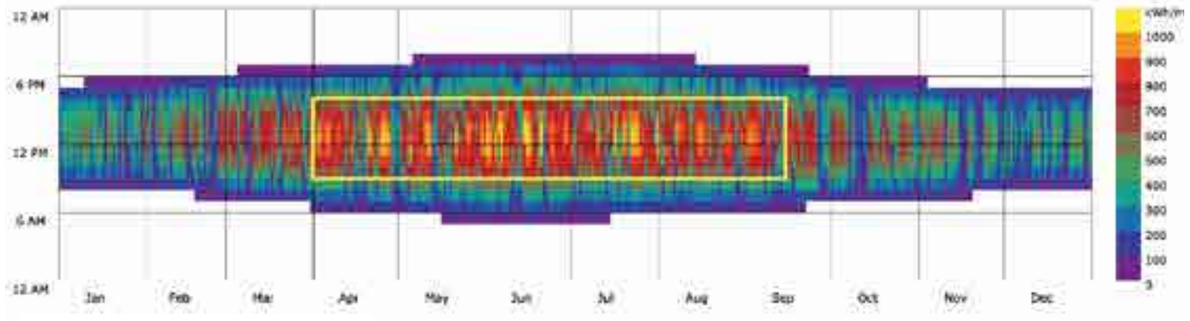


Figure 3-85: Global solar radiation

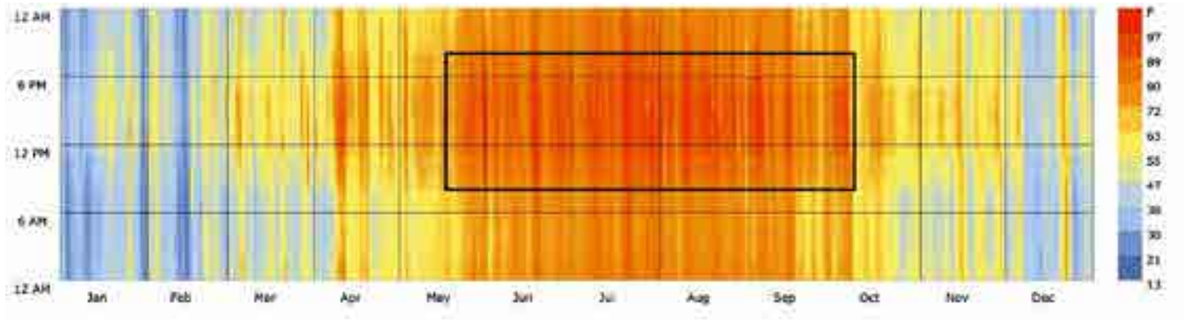


Figure 3-86: Annual temperature

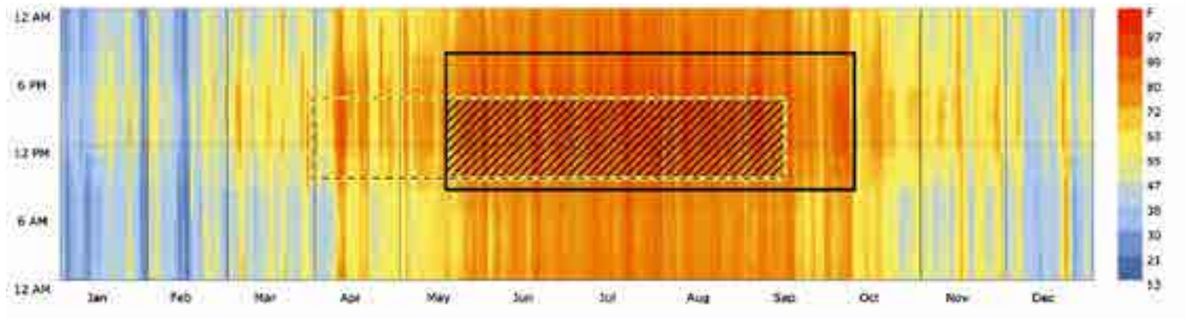


Figure 3-87: Shade required

Alternative A: Compact Campus; Integrating old and new

Solar Heat Gain Study

Solar radiation studies during the summer and winter solstices were performed for Alternative A. During June, the roofs receive the highest cumulative solar radiation (1257 kWh/m^2), followed by the southern facades with approximately 750 kWh/m^2, southwest and south east facades (1000 kWh/m^2), and northern facades (below 500 kWh/m^2). During this period, especially from mid-May to mid-September, facades with highest cumulative solar radiation require more shade and must be protected during the summer to block heat gain to the interior.

During December, the south, southwest and southeast facades receive the highest cumulative solar radiation (1200 kWh/m^2), followed by the roof with approximately 1000 kWh/m^2, and northern facades (below 300 kWh/m^2). During the winter, passive solar heat gain through south-facing windows is beneficial and can enhance thermal comfort inside the buildings.

Well-designed sun control and shading devices can dramatically reduce building peak heat gain and cooling requirements and improve the natural lighting quality of building interiors. South facades are more critical and shading devices must block solar radiation during the summer, maximize solar heat gain during the winter months and provide ample daylight throughout the year. More south facade orientations are beneficial because if well designed they can provide passive heating on sunny winter days while blocking heat gains in the summer. East and west facades are more difficult to protect from solar gains and will provide too much heat in the summer.

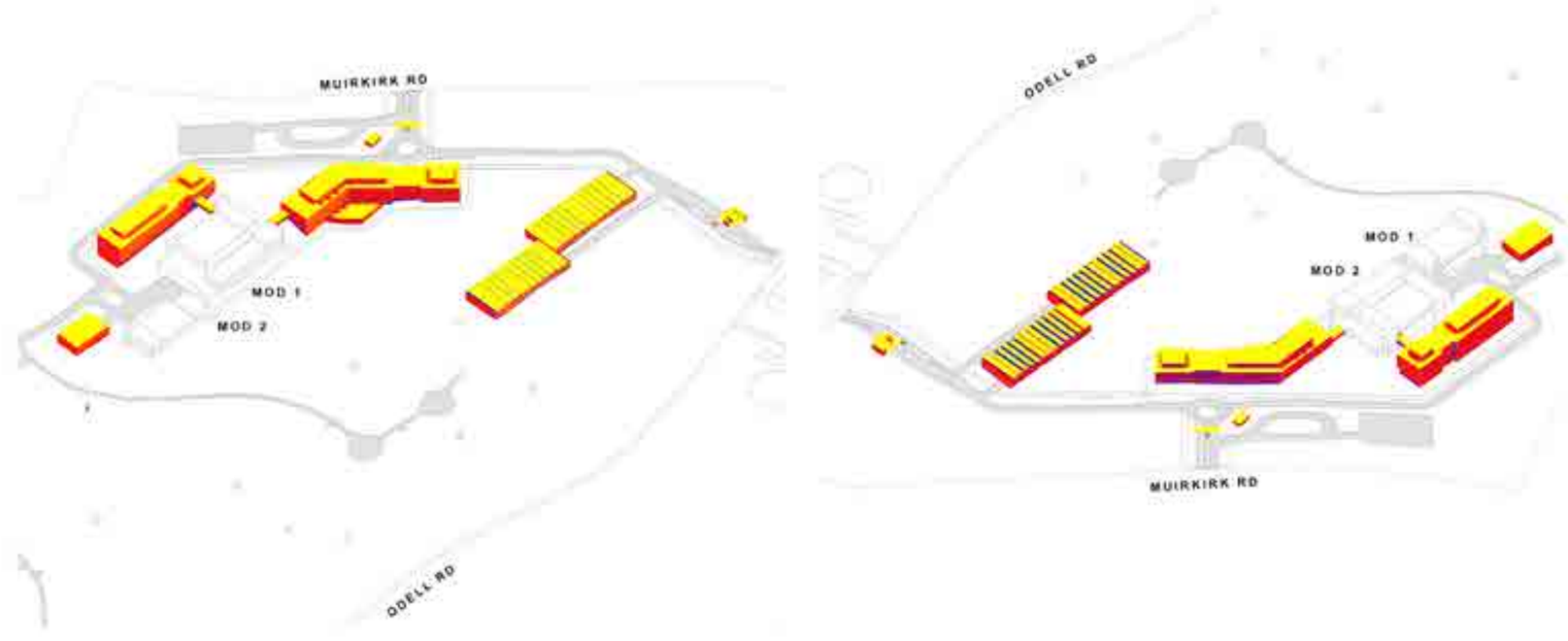


Figure 3-88: Alternative A solar heat gain study - summer solstices

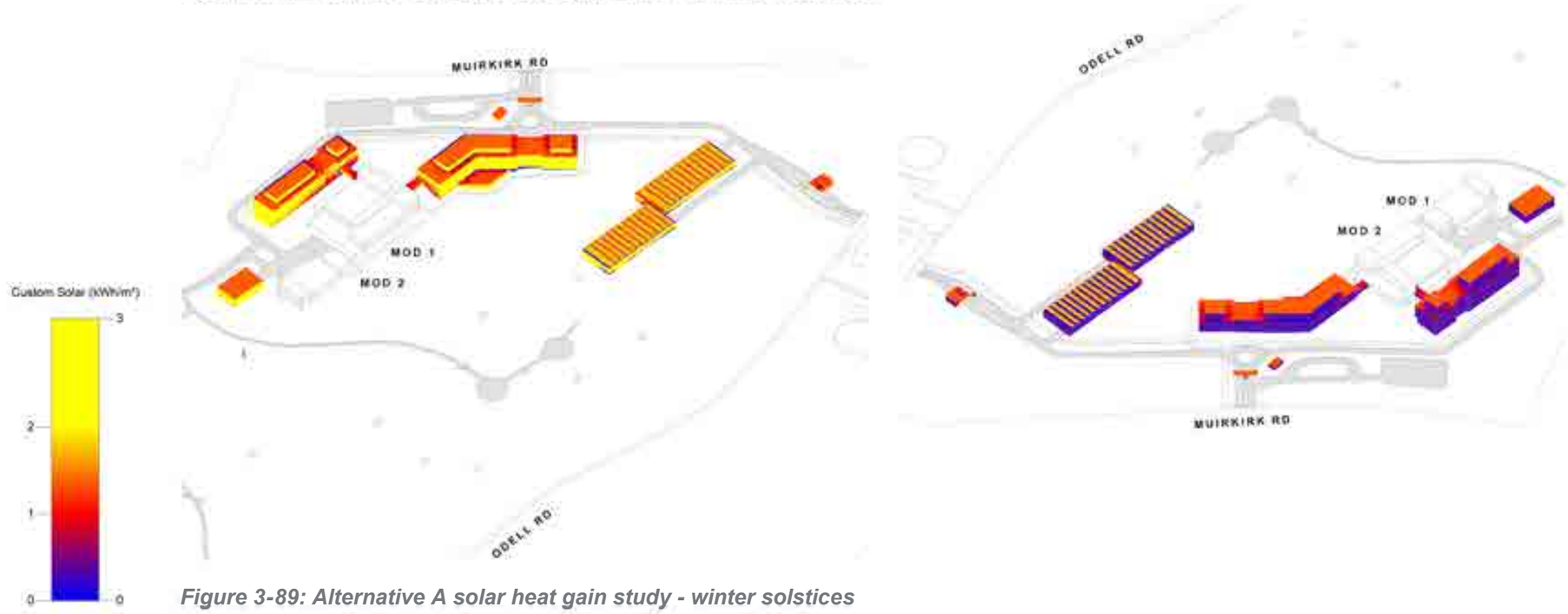


Figure 3-89: Alternative A solar heat gain study - winter solstices

Alternative B: Dual Campus; Distributing development between two sites

Solar Heat Gain Study

Solar radiation studies during the summer and winter solstices were performed for Alternative B. During June, the roofs receive the highest cumulative solar radiation (1257 kWh/m^2), followed by the southern facades with approximately 750 kWh/m^2, southwest and south east facades (1000 kWh/m^2), and northern facades (below 500 kWh/m^2). Facades with highest cumulative solar radiation require more shade and must be protected during the summer to block heat gain. Reducing solar radiation on the surface significantly reduces the negative effect of the surface on thermal comfort during the summer.

During December, the south, southwest and southeast facades receive the highest cumulative solar radiation (1200 kWh/m^2), followed by the roof with approximately 1000 kWh/m^2, and northern facades (below 300 kWh/m^2). During the winter, passive solar heat gain through south-facing windows is beneficial and can enhance thermal comfort inside the buildings.

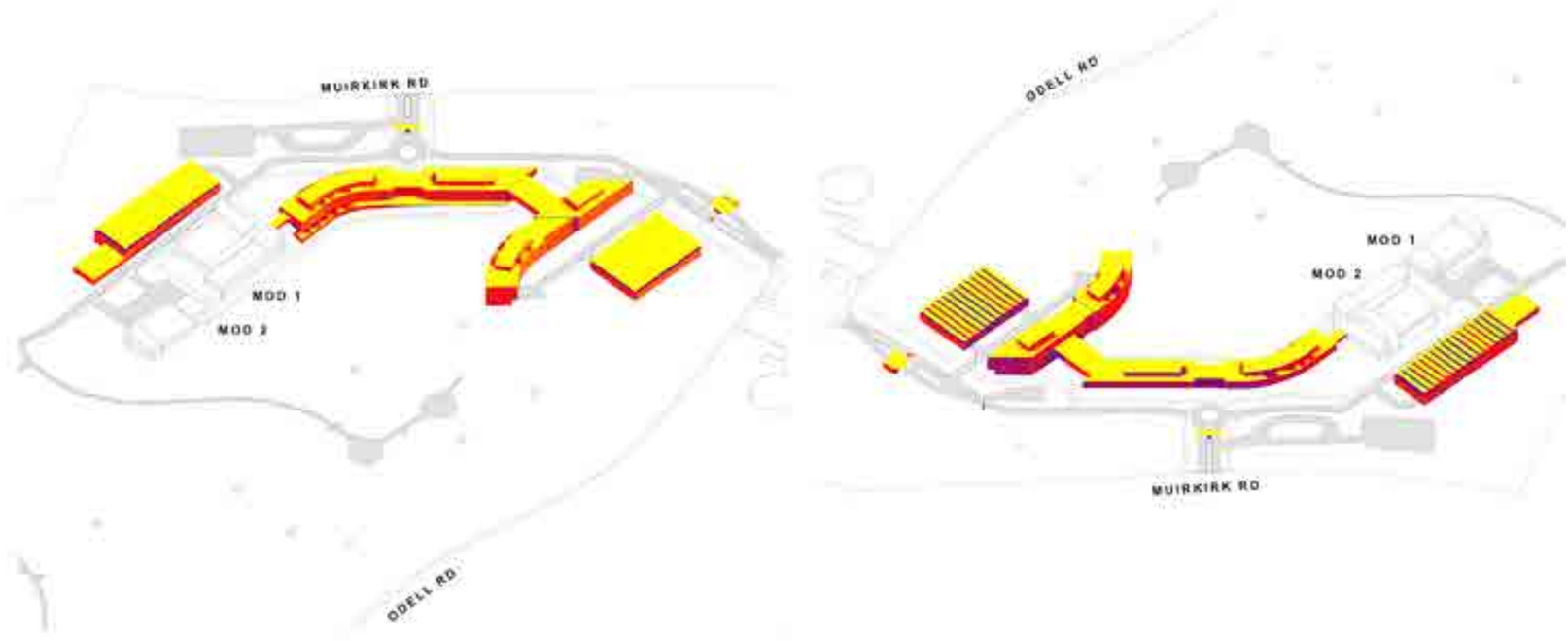


Figure 3-90: Alternative B solar heat gain study - summer solstices

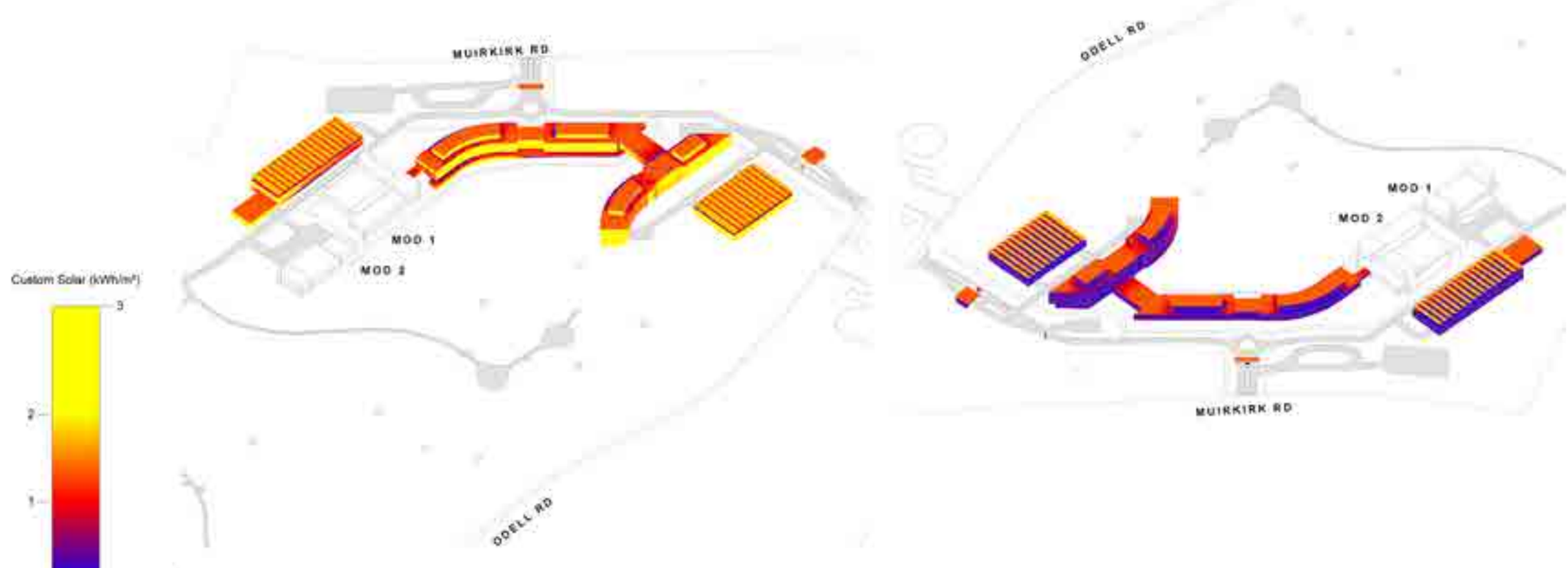


Figure 3-91: Alternative B solar heat gain study - winter solstices

Alternative C: Northeast Campus; Reimagining the BRF

Solar Heat Gain Study

Solar radiation studies during the summer and winter solstices were performed for Alternative C. During June, the roofs receive the highest cumulative solar radiation (1257 kWh/m^2), followed by the southern facades with approximately 750 kWh/m^2, southwest and south east facades (1000 kWh/m^2), and northern facades (below 500 kWh/m^2). Facades with highest cumulative solar radiation require more shade and must be protected during the summer to block heat gain. Reducing solar radiation on the surface significantly reduces the negative effect of the surface on thermal comfort during the summer.

During December, the south, southwest and southeast facades receive the highest cumulative solar radiation (1200 kWh/m^2), followed by the roof with approximately 1000 kWh/m^2, and northern facades (below 300 kWh/m^2). During the winter, passive solar heat gain through south-facing windows is beneficial and can enhance thermal comfort inside the buildings.

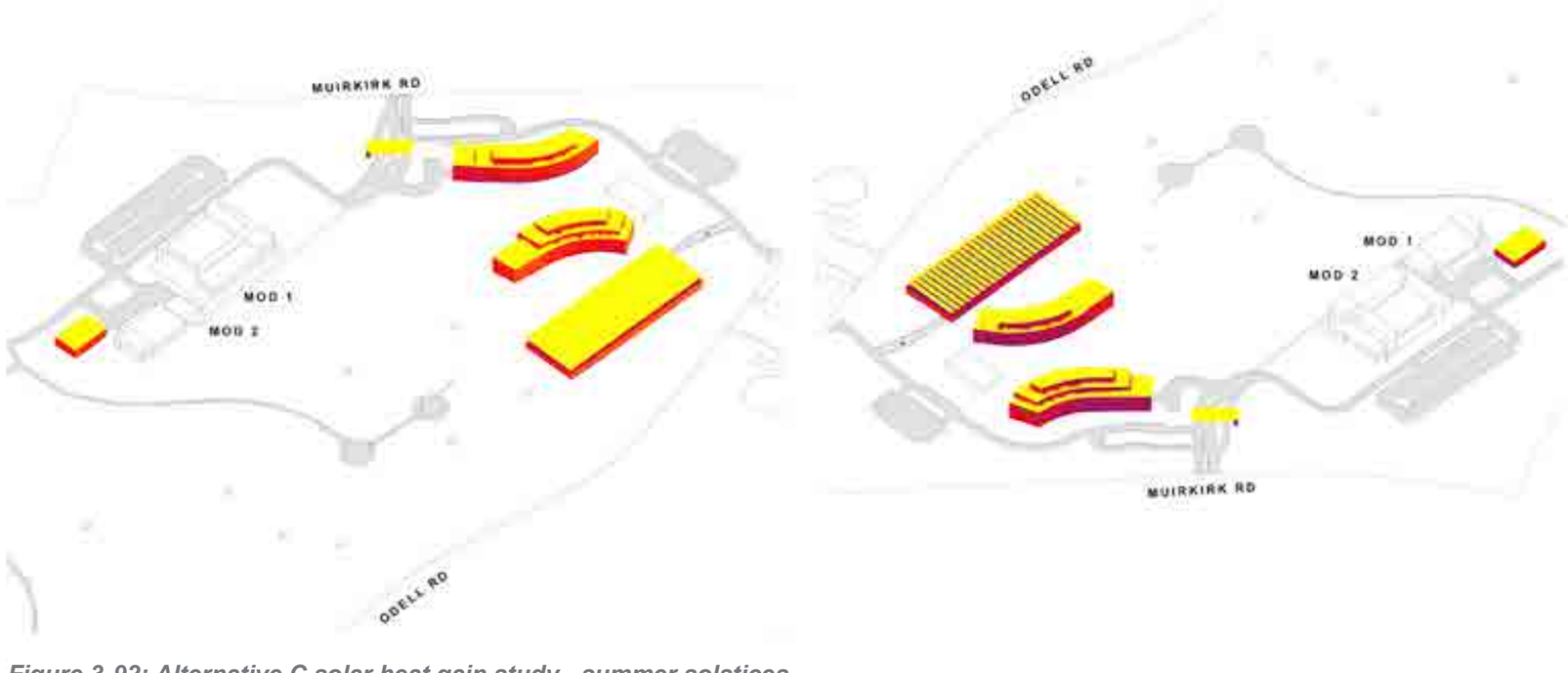


Figure 3-92: Alternative C solar heat gain study - summer solstices

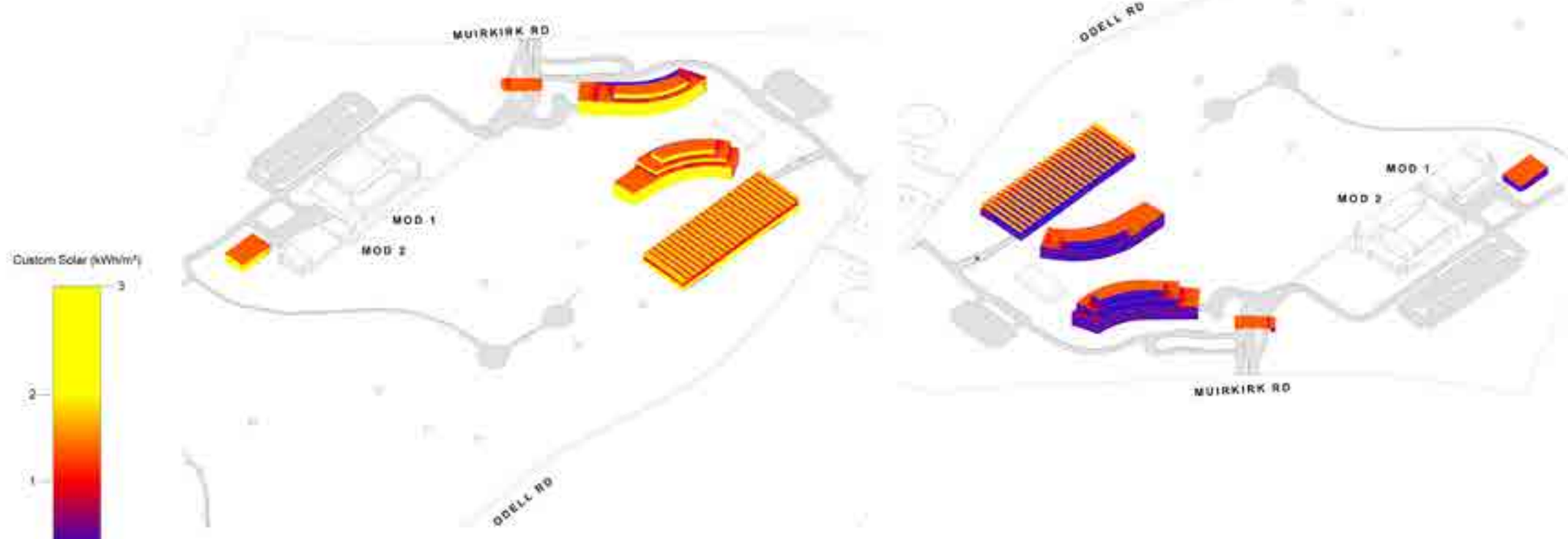


Figure 3-93: Alternative C solar heat gain study - winter solstices

3.12.4 Climate Change Impact on Buildings and Site

The climate is changing and, while weather files are an excellent source to visualize the climate of a specific location during the past 15 years, it is also crucial to be able to predict and visualize the climate based on future scenarios of greenhouse gas emissions to understand the impact on their design so that better informed decisions can be taken.

There are different tools and methods to generate predictive weather files. The information in this Master Plan is based on WeatherShift™ tool, which uses data from global climate change modeling to produce Environment and Public Works (EPW) weather files adjusted for changing climate conditions. EPW files are TMY files that contain hourly values of key weather variables for a typical year and are intended to be used for simulating building energy requirements. The projected data can be viewed for three future time periods based on the emission scenario selected. The Representative Concentration Pathways (RCP) are greenhouse gas emission scenarios for the 21st century adopted by the Intergovernmental Panel on Climate Change (IPCC) as a basis for the climate projections done for its Fifth Assessment (AR5). The designation for each scenario corresponds to the additional radiative forcing in 2100 compared to preindustrial conditions for that scenario. For RCP 4.5, for example, that would be an additional 4.5 W/m^2 of heating in 2100.

The WeatherShift tool adjusts weather files for future climatic conditions based on RCP 4.5 (moderately aggressive mitigation) and RCP 8.5 (business as usual). Figure 3-94 illustrates the projected changes in typical weather conditions for various weather variables including daily maximum temperature and maximum radiation based on RCPs 4.5 and 8.5.

The Daily Maximum Temperature graph based on the RCP 4.5 greenhouse gas emission scenario predicts that maximum temperatures during the month of July will increase by 3.2 °F in 2035, 4.8 °F in 2065, and 5.5 °F in 2090. Meanwhile, when using the RCP 8.5 greenhouse gas emission scenario, maximum temperatures during the month of July could increase by 3.6 °F in 2035, 7.3°F in 2065, and 12 °F in 2090.

The Daily Maximum Global Horizontal Radiation graph based on the RCP 4.5 greenhouse gas emission scenario predicts that the maximum radiation during the month of June will increase by 105 BTU/hr sf in 2035, 11.5 BTU/hr sf in 2065, and 151 BTU/hr sf in 2090. BTU stands for British Thermal Unit which is a unit of heat. Meanwhile, when using the RCP 8.5 greenhouse gas emission scenario, maximum temperatures during the month of June could decrease by 41 BTU/hr sf in 2035 and increase by 184 BTU/hr sf in 2065, and 86 BTU/hr sf in 2090.

Temperature and solar radiation will increase in the future, as seen in the previous graphs, which will have an impact in the design of the buildings and outdoor spaces. The envelope's importance increases so that it must be designed for these future climatic conditions, reducing heat gains to the interior. This means that the envelope will require more solar protection, window to wall rations should be appropriate to its orientation, and glazing should be high performance minimizing the amount of heat transmitted into space in the hottest months while keeping heat inside during the winter. Higher temperatures in the summer will impact thermal comfort and shade and summer breezes will be increasingly important.

Climate effects on site are further explored with NOAA's online, opensource "Climate Explorer Tool" which allows to understand additional climate change effects in a location in addition to temperature, supporting long range plans to build climate resilience in different locations.

The Figure 3-96 shows the following values:
- Historical Observed: Observed annual averages, shown as the difference from the long-term average for the late 1900s. The horizontal line from which bars extend up and down is the average from 1961-1990.
- Historical Modeled: Range of climate model output for historical period (1950-2006). Also called

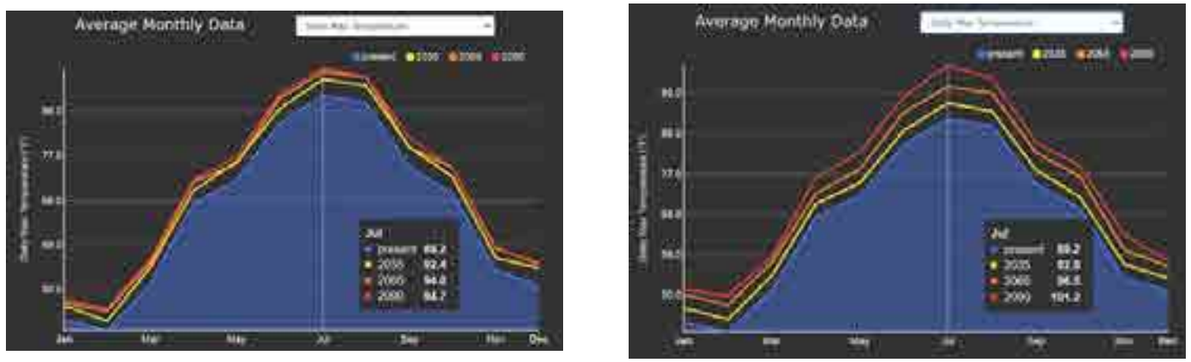


Figure 3-94: Daily maximum temperature graph

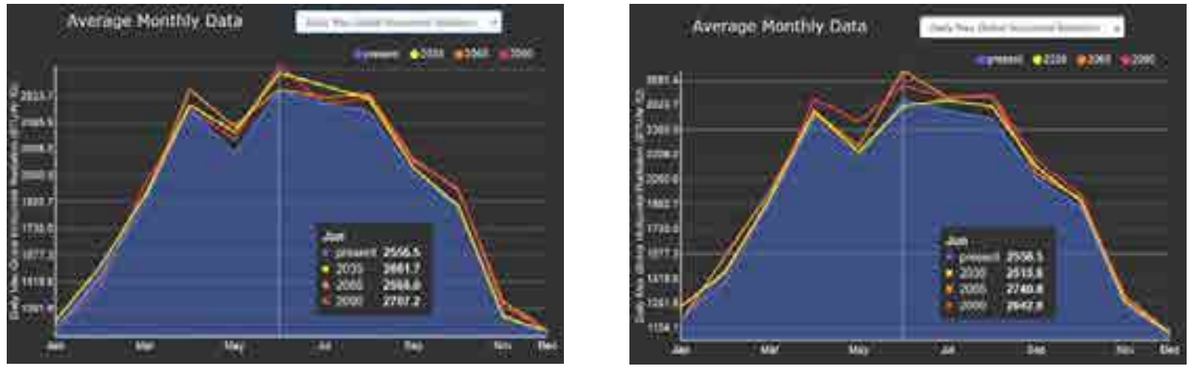


Figure 3-95: Daily maximum global horizontal radiation graph

hindcasts or simulations.
• Lower Emissions: Range of climate model projections for 2006-2100 if global emissions of heat-trapping gases are stabilized by 2040 and then dramatically reduced. Blue line shows weighted mean of all projections at each time step.
• Higher Emissions: Range of climate model projections for 2006-2100 assuming global emissions of heat-trapping gases continue increasing through 2100. Red line shows weighted mean of all projections at each time step.

Average Daily Maximum Temperature (°F)

A day's highest (maximum) temperature usually occurs in the afternoon. Averaging the daily high temperatures over any period results in a mean maximum temperature for that period. Maximum temperature serves as one measure of comfort and safety for people and for the health of plants and animals. When maximum temperature exceeds certain thresholds, people can become ill, and transportation and energy infrastructure may be stressed. The increase in temperature is also clear in this period, which will potentially increase cooling loads in the summer and reduce heating loads in the winter and affect thermal comfort in outdoor spaces (see Figure 3-96).

Total Precipitation

Total precipitation over a year, season, or month indicates the average amount of water added to the environment over the indicated period. The graph for this variable shows total precipitation in inches. Total precipitation will be relatively constant over this period (see Figure 3-97).

Cooling Degree Days

The number of cooling degree days at any location reflects the amount of energy people use to cool a building when it is warm outside. Higher numbers of cooling degree days indicate higher demand for energy. Cooling degree days measure how much (in degrees), and for how long (in days), outside air temperature is higher than a certain reference value, in this case 65°F. For example, on a day when the average outdoor temperature is 85°F, reducing the indoor temperature to 65°F would require 20 degrees of cooling multiplied by 1 day, or 20 cooling degree days. Cooling degree days will increase over time which will increase cooling loads. In addition to these results, the top climate concerns for this region based on the top regional hazards for Washington, DC, according to the 2018 National Climate Assessment are described below, comparing projections for the middle third of this century (2035-2064) with average conditions observed from 1961-1990 (see Figure 3-98).

Changed seasonal patterns may affect rural ecosystems, environments, and economies.

Annual counts of intense rainstorms — those that drop two or more inches in one day – are projected to have between a 1 percent decrease and a 4 percent increase. Historically, Washington averaged 1 (0 - 5) intense rainstorms per year.

Extreme temperatures on the hottest days of the year are projected to increase between 1 - 20°F. Historically, extreme temperatures in Washington averaged 95°F (92 - 105°F).

Figure 3-96: Average daily maximum temperature

Figure 3-97: Total precipitation

Figure 3-98: Cooling degree days

3.13 Sustainable Design

The Master Plan is designed with the intent to:
• achieve the highest possible degree of sustainability within the project constraints,
• pursue at least LEED® Gold certification for future projects, and
• evaluate ways to achieve energy and water net neutrality to the extent possible.

Site

The LEED® process began with the act of consolidating FDA facilities onto fewer, pedestrian-oriented campuses.

Goals:
• Keep site disturbance to a minimum by preserving wetlands and woodlands, including landscaped areas and mature trees
• Locate new facilities within walking distances of bus stop, encourage the use of public transportation
• Limit employee parking, create stronger connection of the campus to public transit, and provide substantial biking and pedestrian paths on the campus

Strategies:
• Assume 1:2 parking ratio
• Provide preferred parking for low emission vehicles and car/ vanpooling
• Create secured storage and shower facilities for bicyclists
• Maximize open/green space on site vs. building and parking footprints
• Manage stormwater quality and quantity
• Capture and treat stormwater runoff from impervious areas for water quality
• Minimize the heat island effect by using light-colored roofs and shaded pavements
• Reduce light pollution
• Include green roofs on office buildings

Water

Goals:
• Maximize water efficiency
• No potable water used for irrigation
• Apply SWM best practices

Strategies:
• Use low-flow/no-flow plumbing fixtures in the facilities
• Design water efficient landscaping
• Harvest rooftop rainwater for use in toilet flushing and cooling

Energy & Atmosphere

Goals:
• Use high performance mechanical and electrical equipment and innovative design
• Achieve increased levels of energy performance to reduce environmental and economic impacts associated with excessive energy use
• Minimize heat island effect
• Achieve Zero Net Energy consumption for the buildings. The total amount of energy used by the building on an annual basis should be equal to the amount of renewable energy created on the site

Strategies:
• Exhaust heat recovery system
• High-efficiency HVAC systems
• Occupancy sensors for office lights
• Active and passive solar techniques
• Energy (enthalpy) recovery wheel systems
• Free cooling/preheat conditioning systems
• Low temperature HVAC air systems
• Dual duct CO_2 system
• Natural ventilation systems
• Building commissioning
• Environmentally compliant refrigerators

Materials & Resources

Goals:
• Reduce material waste
• Implementation of a campus wide recycling program
• Collect recycled materials
• Explore the potential to design structural components for disassembly

Strategies:
• Recycle demolished and discarded building materials
• Use locally manufactured brick
• Implement construction waste management plan
• Use chilled beam system or the most advanced technology available
• Consider mass timber for construction

Indoor Environmental Quality

Goals:
• Efficient and filtered air handling systems including state of the art air purification systems to eliminate virus particles such as COVID
• Natural daylighting and ventilation
• Achieve more than 50 percent Spatial Daylight Autonomy (SDA) in all buildings
• Use low emitting interior materials
• Provide occupants with a healthy, comfortable work environment

Strategies:
• Night flushing with thermal mass
• Enhanced C02 based demand control ventilation
• Integrate biophilia in the buildings
• Commission building using Low VOC materials
• Natural thermo-syphon ventilation

Embodied Carbon

The building design of future buildings at the MRC should follow the American Institute of Architect's (AIA) "ten steps to reducing embodied carbon".

Goals:
• Integrate whole building approaches to reduce embodied carbon from the project
• Limit the total of embodied carbon of new buildings to 500 kg CO_2e/m^2
• Disclose and offset 100 percent if the embodied carbon emissions associated with the construction and materials of a project

Strategies:
• Reuse buildings instead of constructing new ones
• Specify low-carbon concrete mixes
• Limit carbon-intensive materials (such as aluminum, plastics, and foam insulation)
• Choose lower carbon alternatives for the structure
• Choose carbon sequestering materials. (wood, straw, or hemp insulation)
• Reuse materials
• Use high-recycled content materials
• Maximize structural efficiency
• Use fewer finish materials
• Minimize waste

Innovative Design

FDA is committed to innovative design.
Strategies:
• Campus-wide green cleaning/housekeeping program
• Green education program
• LEED® certified professionals on the design team

Future Standards

The proposed master plan is guided by the following Federal standards:
• Executive Order 14008 - Tackling the Climate Crisis at Home and Abroad (January 27, 2021)
• Executive Order 13990 - Protecting Public Health and the Environment and Restoring Science to tackle the Climate Crisis (January 20, 2021).
• Executive Order 13508 - Federal Leadership in Chesapeake Bay Protection and Restoration
• FDA's Agency Sustainability Plan
• EISA 438 - Stormwater runoff requirements for federal development projects
• MD MDE MS4 Permit - General Permit for Discharges from State and Federal Small Municipal Separate Storm Sewer Systems

This will result in future construction designed to meet the following strategies:
- LEED® Gold certification
- Energy Net Zero Buildings
- Water Net Zero
- Sustainable Sites Initiative™ (SITES™) Silver certification
- WELL certification
- Park Smart certification

Additionally, the building design should adhere to the following standards to reduce fossil-fuel energy use. The Energy Independence and Security Act of 2007 calls for a 100 percent reduction in fossil-fuel energy use (relative to 2003 levels) for new Federal buildings and major renovations by 2030.

Net Zero Energy

A Net Zero Energy (NZE) building produces enough renewable energy to meet its own annual energy consumption requirements, reducing the use of non-renewable energy in the building sector. To achieve NZE the project must be planned as an NZE building from the beginning. This is achieved by first implementing strategies that reduce energy consumption and then installing clean renewable energy to offset whatever energy consumption is left. An NZE building will also be net zero carbon for operation since all the energy used by the building produces zero emissions. Figure 3-99 shows the basic concept of NZE buildings.

Two key metrics important to consider in the design of an NZE building are:

- the amount of energy used by the building, and
- the amount of energy that can be generated on site.

The Energy Use Intensity (EUI) is an indicator of the energy efficiency of a building's design and/or operations, calculated by dividing the total energy consumed by the building in one year by the total gross floor area of the building. To design a high performing low EUI building energy efficiency multiple high efficiency measures must be implemented such as better than code envelope insulation (roofs, walls, windows, windows etc.), solar + battery systems, geothermal systems, chilled beams, daylight sensors, and building management system.

Renewable energy must offset energy used by the building. Typically, the amount of energy that can be generated on site is limited. Therefore, it is even more important to design a high performing, low EUI building. According to the National Renewable Energy Laboratory (NREL) and National Solar Radiation Database (NSRDB) the average solar radiation on a horizontal surface on the site is 4.26kWh /m² day which goes up to 5 kWh /m² day, when the surface is facing south and tilted 40°.

All NZE buildings must also have a boundary that defines the area within which the renewable system is located. This also the area for which delivered and exported energy is measured. This boundary can be around the building footprint if the on-site renewable energy is located within the building footprint.

The boundary can also be around the building site. At the MRC, renewable energy will be generated on the site and not just within the building footprint. Figure 3-100 shows the boundary area of renewable systems as described above. For more information, see "A Common Definition for Zero Energy Buildings" prepared for the U.S. Department of Energy (USDOE) by the National Institute of Building Sciences (2016).

The ILFI's ZE certification allows projects to demonstrate ZE performance. This program is the only international ZE certification that certifies that the building is truly operating as claimed, harnessing energy from the sun, wind, or earth to produce net annual energy demand through a third-party audit of actual performance data. The goal of the ILFI ZE standard is to ensure that 100 percent of the building's energy needs on a net annual basis must be supplied by on-site renewable energy. No combustion is allowed.

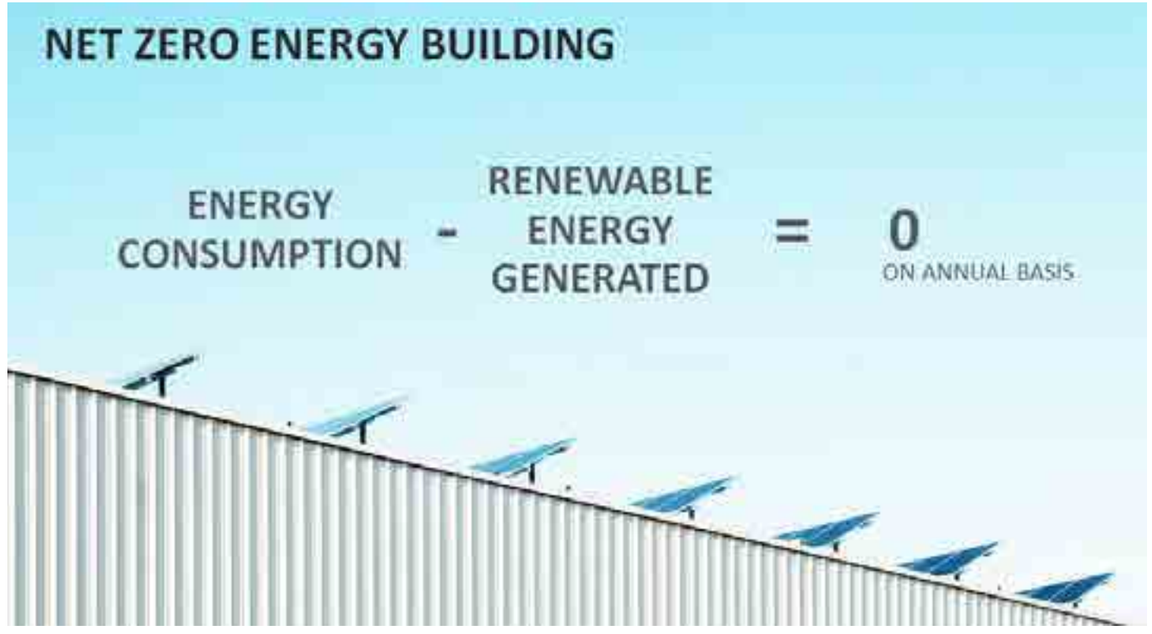


Figure 3-99: Concept of net zero energy buildings (Source: CRTKL, 2021)

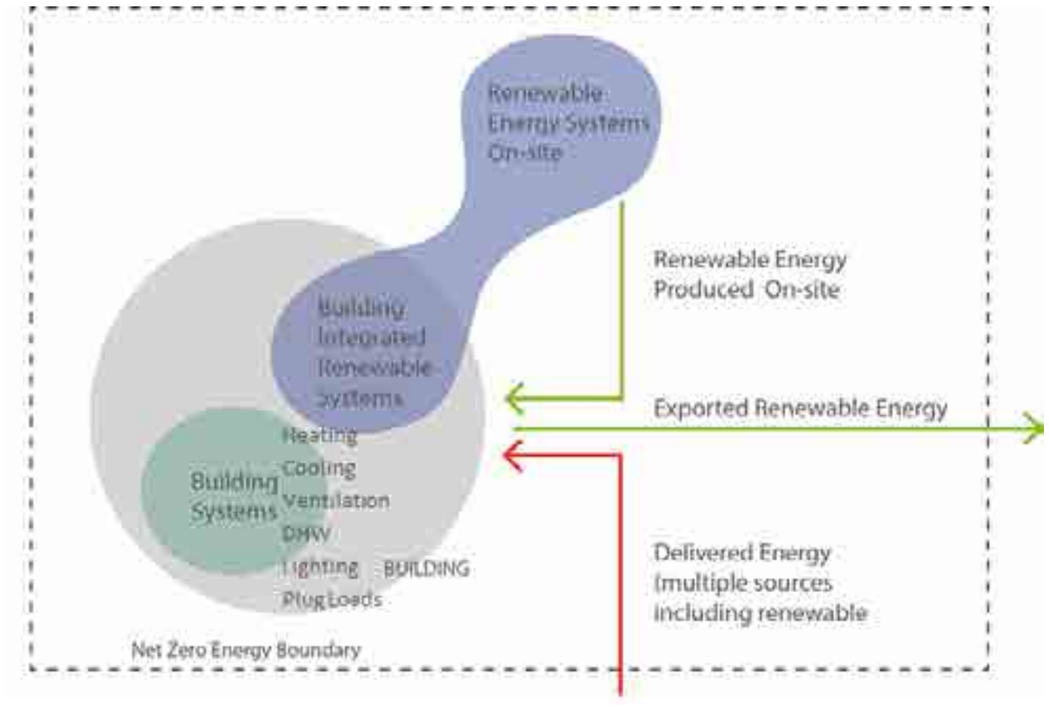


Figure 3-100: NZE buildings and boundary (Source: "Carbon-Neutral Architectural Design" by Pablo LaRoche, 2012)

Alternative A: Compact Campus; Integrating old and new

Sustainability features

1. Bioswale Adjacent to Roads & Parking Areas
2. Green Roof
3. Solar Panels
4. Green Wall Adjacent to Parking Garage
5. Micro-Bioretention
6. Potential Underground Stormwater Storage
7. Reforested Area

Figure 3-101: Alternative A sustainability features

Landscape Precedent Imagery

Figure 3-102: Landscape precedent imagery

Alternative B: Dual Campus; Distributing development between two sites

Sustainability Features

1. Bioswale Adjacent to Roads & Parking Areas
2. Green Roof
3. Solar Panels
4. Green Wall Adjacent to Parking Garage
5. Micro-Bioretention
6. Potential Underground Stormwater Storage
7. Reforested Area

Figure 3-103: Alternative B sustainability features

Landscape Precedent Imagery

Figure 3-104: Landscape precedent imagery

Alternative C: Northeast Campus; Reimagining the BRF

Sustainability Features

1. Bioswale Adjacent to Roads & Parking Areas
2. Green Roof
3. Solar Panels
4. Green Wall Adjacent to Parking Garage
5. Micro-Bioretention
6. Potential Underground Stormwater Storage
7. Reforested Area

Figure 3-105: Alternative C sustainability features

Landscape Precedent Imagery

Figure 3-106: Landscape precedent imagery

Elevated Boardwalk

The walkway is anticipated to be an elevated boardwalk type of structure that is constructed “on deck” in sections. The on-deck construction is important so that disturbance from construction activity is minimized.

The structural piers can be of wood or concrete with steel or wood structural decks depending on the spans, height from the ground, load limits, and radii of the boardwalk. Decking material itself can be sustainably farmed from tropical hardwoods, composite wood, prefabricated concrete planks, or cor-ten steel bar grating. Final layout should be determined in the field to preserve and protect; all trees; vegetated sensitive slopes, wetland vegetation, and visually valuable natural features or habitat.

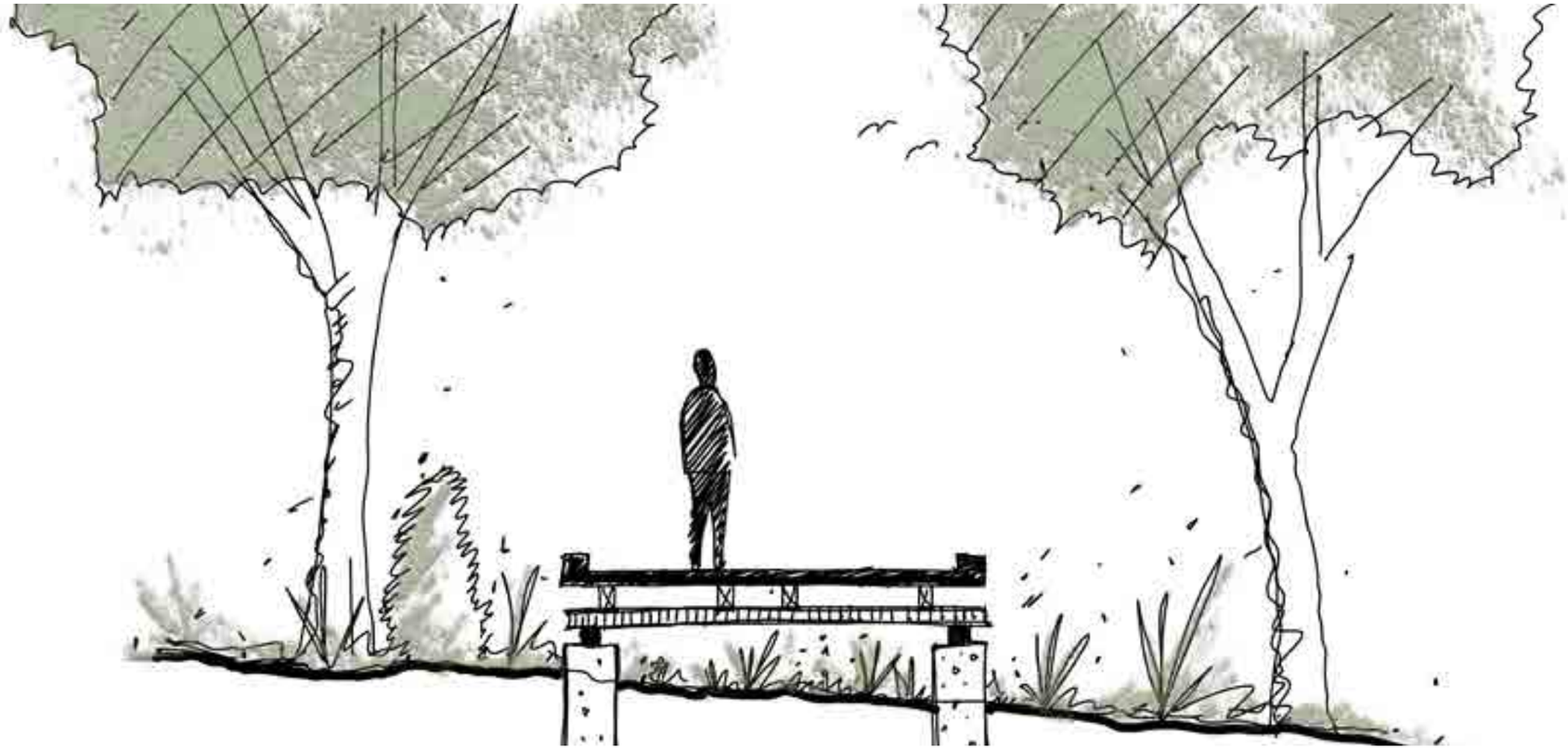


Figure 3-107: Elevated boardwalk strategy

Parking

Parking lot areas are great opportunities and should be designed as critical pieces of a site's sustainability and resiliency. Primarily parking lot areas with the integration of pervious paving, bioswales, rain gardens, and retention areas can slow, store, and filter a large portion of a site's stormwater runoff. Secondarily parking areas are great locations for additional photovoltaic panels that can also provide premium covered parking spaces. Parking lots should also prioritize vanpool, electric charging stations and other similar features that promote the reduction of greenhouse gasses and the reduction of regional vehicular traffic. Bioswales in parking lots should also be constructed and planted for simple bi-annual maintenance and consider snow management.

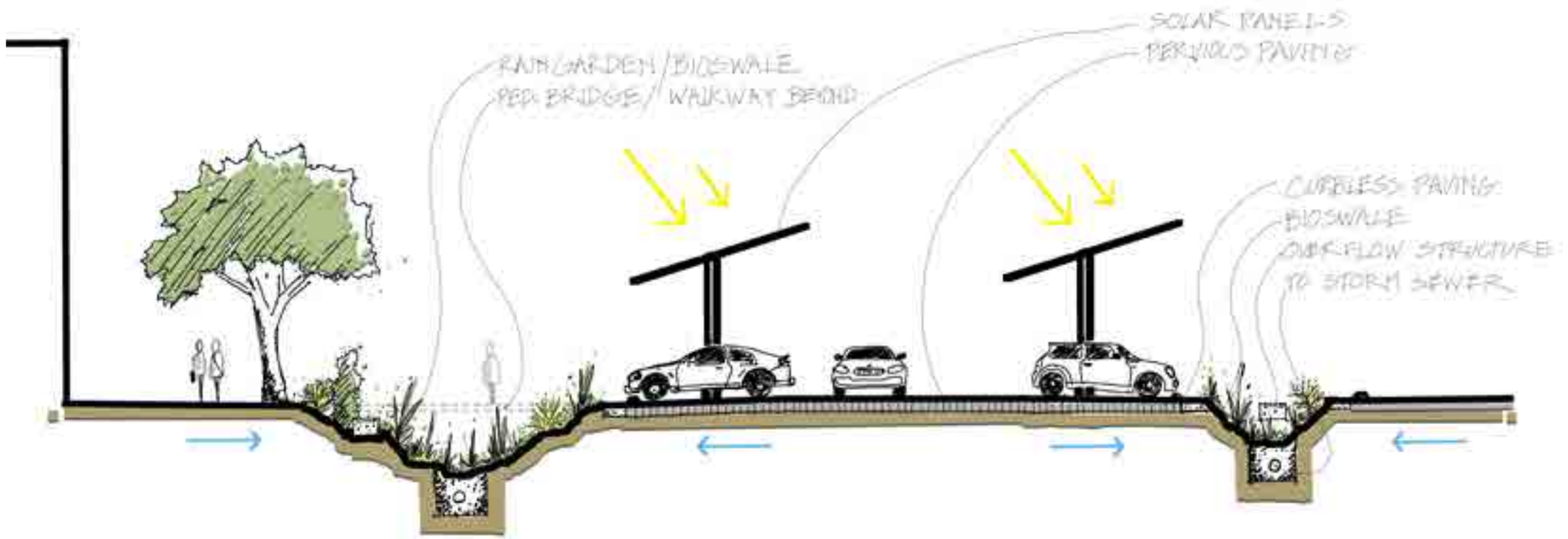


Figure 3-108: Parking strategy

Green Roof

An integrated green roof, stormwater management, and Solar strategy will maximize building and site resiliency. Embracing natural and ecosystem services from the landscape to the roofscape should be considered for each building.

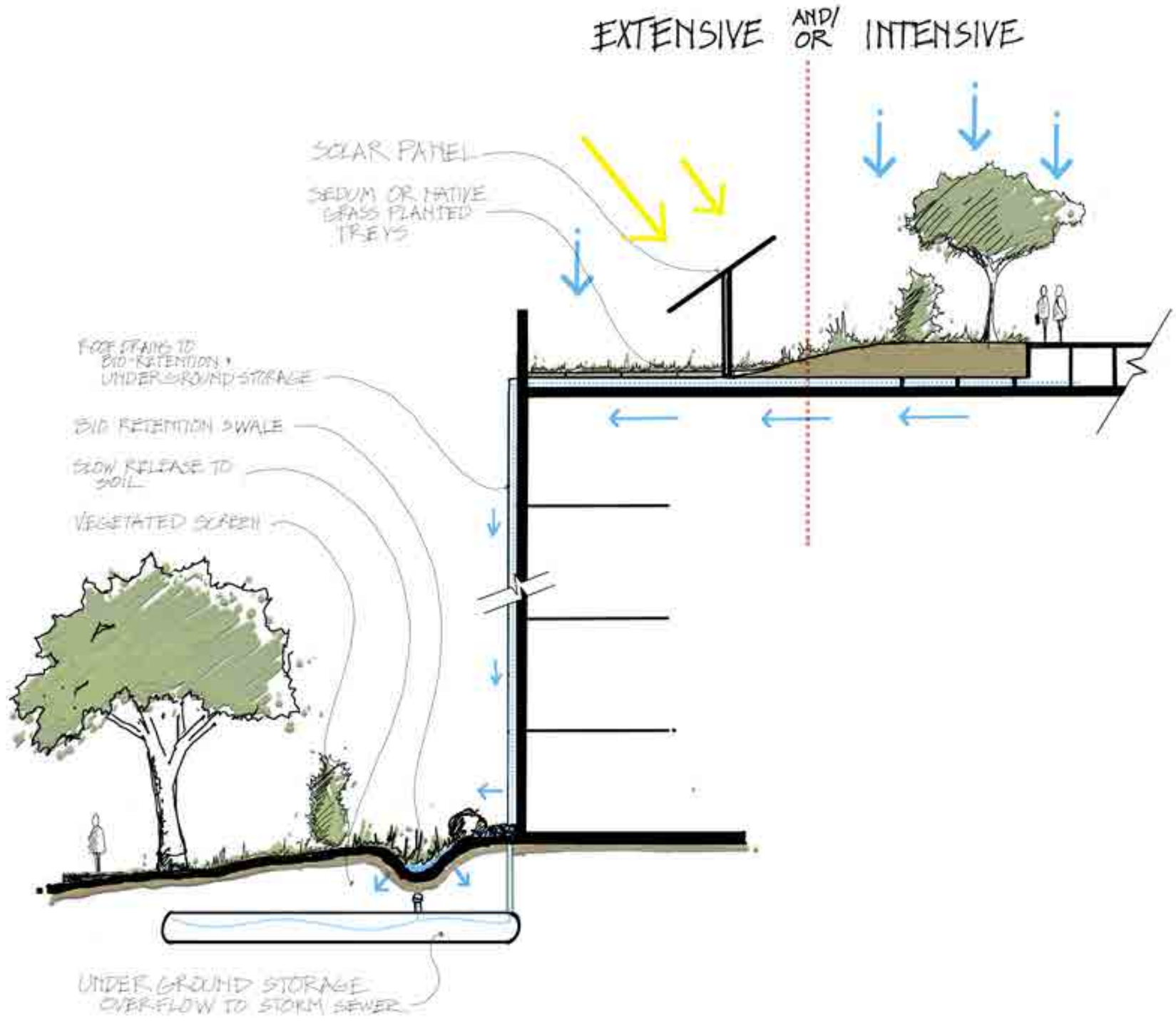


Figure 3-109: Green roof and stormwater management strategy

Green Wall and Micro-Bioretention

Goals:

- energy saving due to evaporative cooling and shading
- indoor noise reduction
- air quality/ventilation
- promotes bio-diversity
- biophilic design response
- increased stormwater management capacity,
- improve water quality downstream

A green wall that is supported by irrigation and a growing medium (soil) at grade, and given a proper support cabling system will act to achieve the above stated goals with minimal maintenance with a relatively cost effective initial installation costs compared to other “living wall” alternatives that utilize individual potted plants placed in a vertical tray system. The latter “Living wall” is not advised at larger scales as they require a much higher initial installation and ongoing maintenance cost.

“Tendril” or “twining” climbing vine species should be selected in lieu of sucker or hook-climbing vines. Trellis spacing should be adjusted for optimal reach distances based on species selected. This distance can vary significantly per species.

To the extent possible, green walls will be applied to parking structures. The Master Plan anticipates that 50 percent of the facade of the parking structures, specifically the south, southwest and -east facing walls, will be green walls.

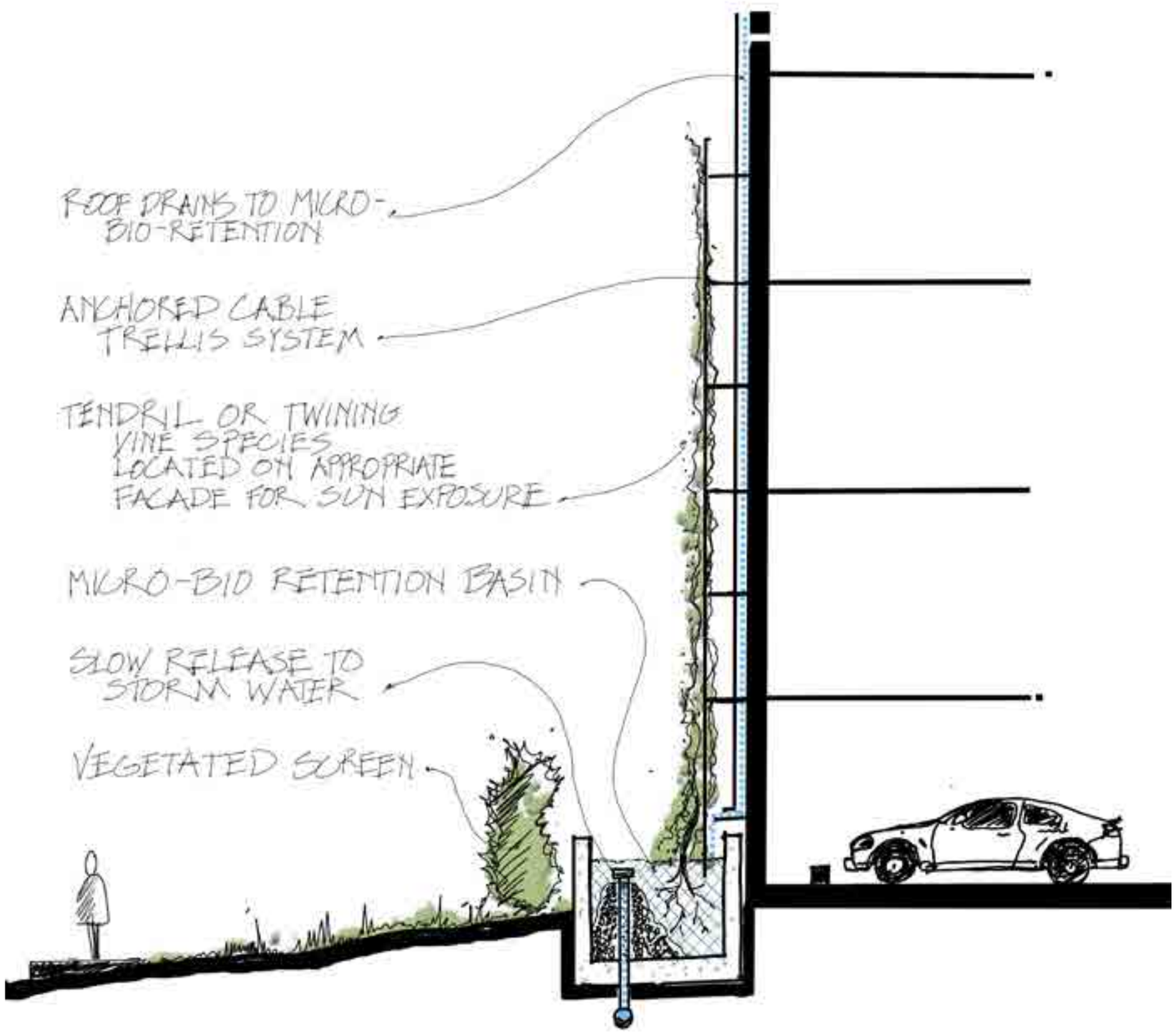


Figure 3-110: Green wall and micro-bioretention strategy at parking garages

3.14 Security Design

3.14.1 Perimeter Security

As a civilian Federal facility, the MRC must adhere to the latest standard of the "Physical Security Criteria for Federal Facilities" per the Interagency Security Committee (ISC). A facility's security is based on five components identified in the ISC Risk Management Process: mission criticality, symbolism, facility population, facility size and threat to tenants. Based on these components, the MRC is considered a Level III Facility.

The overarching security goal for the campus is the protection of the staff, and to that requirement it is necessary to safeguard the inhabited facilities.

Design-Based Threats have not been finalized for this site. For the Master Plan, perimeter security via setbacks is governed by ISC Level III requirements. While the Crime Prevention Through Environmental Design (CPTED) can be used, the governing standard should be ISC. As such, the team is utilizing CPTED and best industry practices for the overall planning and protection strategies. Notable aspects include the establishment of fenced perimeters with restricted access for both pedestrians and vehicles. For Federal facilities, the key design strategy is to incorporate building setbacks to limit the damage from potential blast events. The final setback distances and building construction criteria will need to be ultimately established with a threat assessment the project's force protection engineer. In addition to the security zone at the perimeter of the MRC, the Master Plan also assumes that the buildings and parking structures on the campus are set back 50 feet from the internal roads. This distance is maintained to prevent vehicles from driving into the buildings. Additional measures will be taken to form an anti-ram barrier between the roads and the buildings.

The perimeter of the MRC is required to meet the Level III security requirements and reinforce its presence as a U.S. Government Facility. As such, the Master Plan will need to incorporate those elements necessary to restrict the uncontrolled access of both vehicles and pedestrians. The existing perimeter fence will be extended and enhanced to accommodate all the new development. These include additional fencing, access control equipment, intrusion detection devices, site lighting and security patrol pathways. Where possible, the site perimeter security boundary will incorporate the existing natural site features and landscape design elements. See Figure 3-121 for precedent images of fences that enhance the landscape.

In all three Action Alternatives, access to the site occurs via the main entrance at Muirkirk Road and a secondary entrance at Odell Road. These entrances are gated and everyone entering the campus will have to go through a security checkpoint. To gain access into the buildings and the campus grounds, employees and visitors will need to be screened. Once screened, they enter the inner perimeter, which allows them to freely move around in between the buildings, common areas, and shared amenity spaces, including the central natural landscape and stream valley.

3.14.2 Inner Perimeter Security

Once a preferred alternative has been selected, the Design Team will work with FDA to determine the minimum standoff requirements for each individual building. If possible, the stand-off will be achieved, with use of the natural topography, new landscape elements, outdoor spaces, and stormwater best management features (see Figure 3-111).

The Master Plan aims for holistic solutions that establish the requisite stand-off, while ensuring that the design integrates a quality campus experience within the context of a totally green pedestrian-friendly environment. Only if necessary, will bollards and vehicle barriers be used to provide the requisite hardening and setbacks. Walking and other outside activities are key elements of the design and the campus planning encourages wellness behaviors. Circulation pathways and adjacent green spaces are unrestricted and unimpeded to pedestrians within the inner campus once both staff and pass a security screening point.

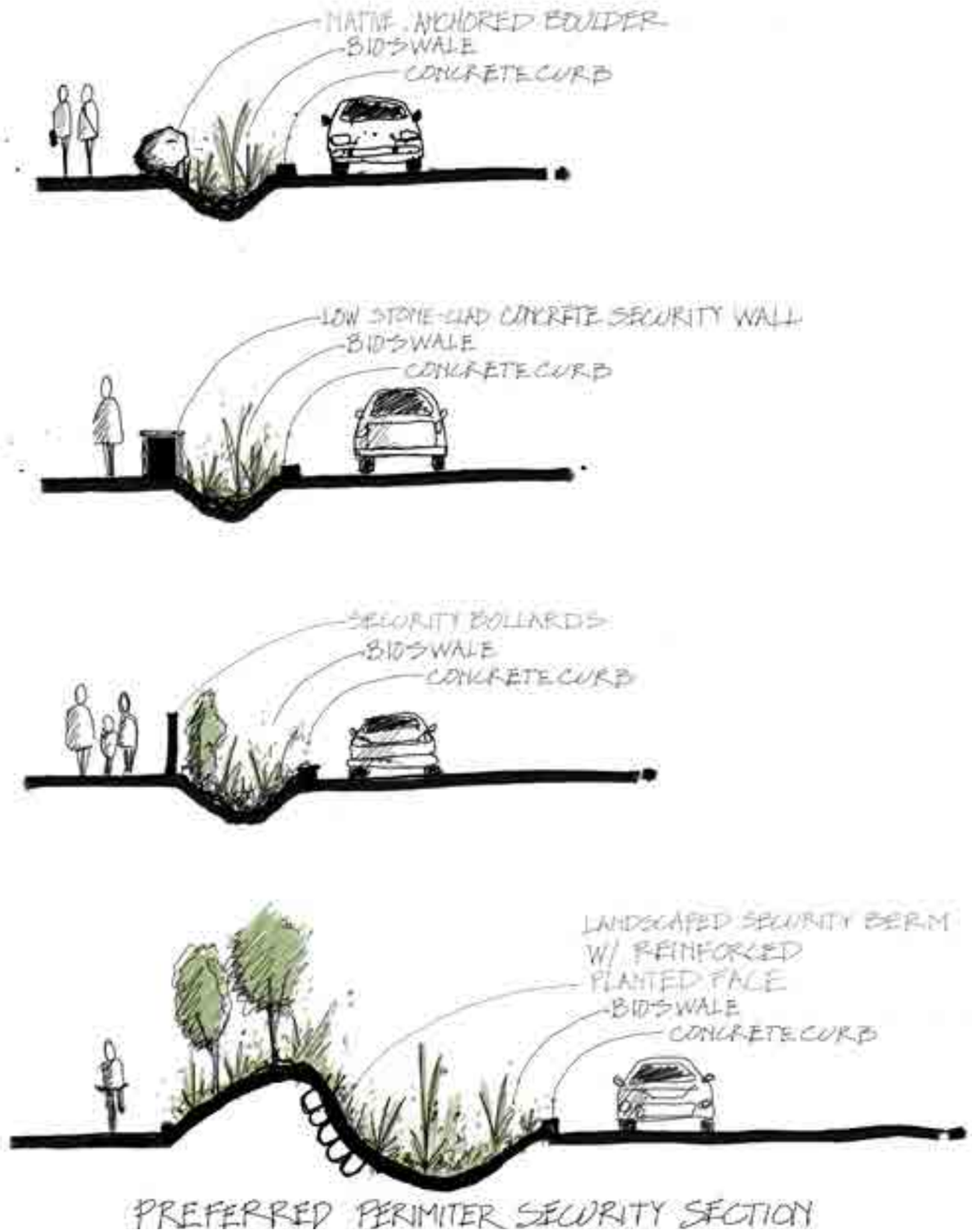


Figure 3-111: Different strategies to integrate security features into the landscape

Alternative A: Compact Campus; Integrating old and new

Security & Environmental Constraints

LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- Parking Structure
- Stream Valley Buffer
- Primary Access
- Secondary Access
- Restricted Access
- Landscape Buffer (100 ft)
- Site Setback (164 ft)
- Outer Fence
- Anti-Ram Barrier
- Inner Fence
- Secured Area
- Primary Screening Entrance (Staff/Visitors)
- Potential Secured Entrance (Staff/Visitors)
- Building Stand-off (50 ft)

0 150 300 600 Feet

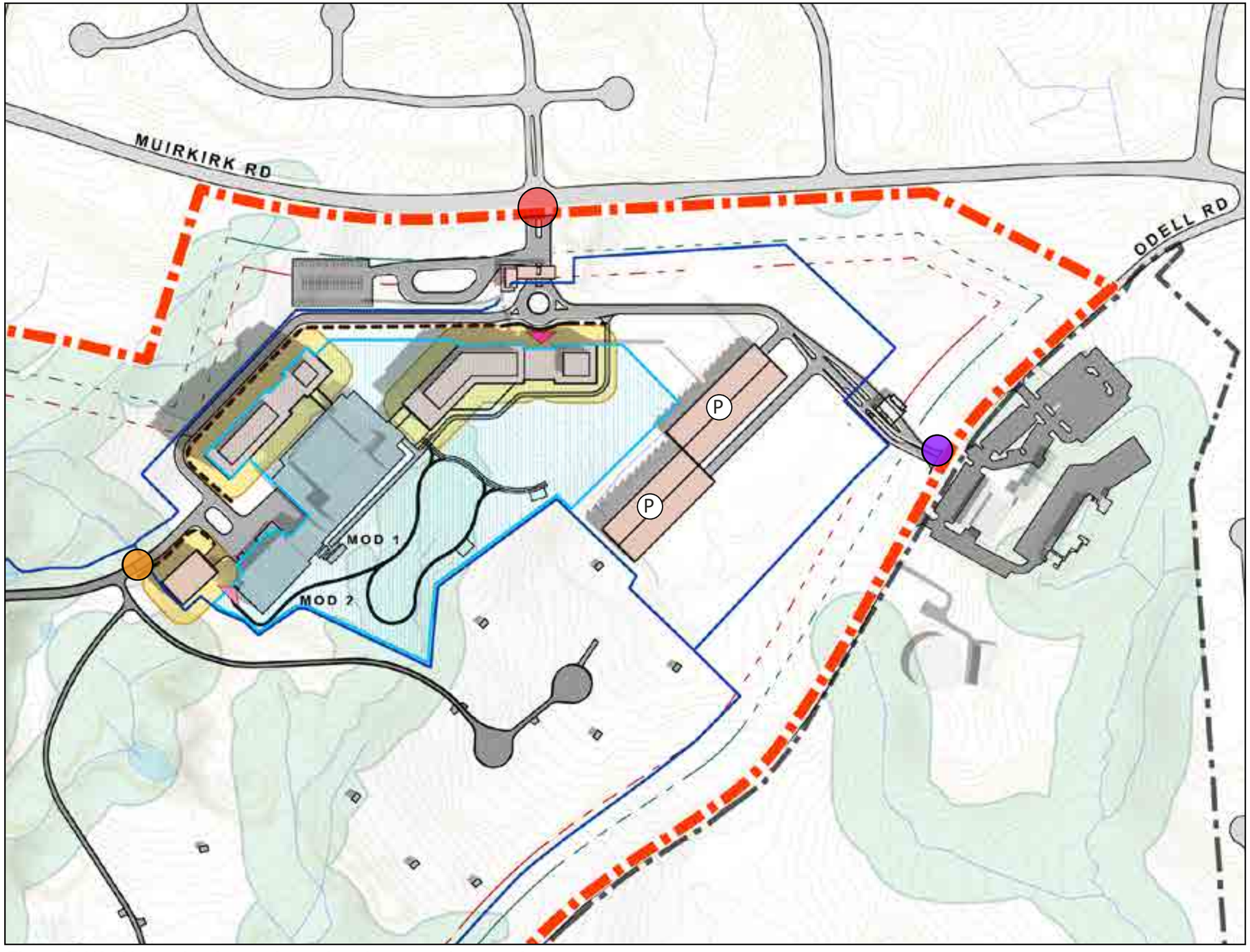
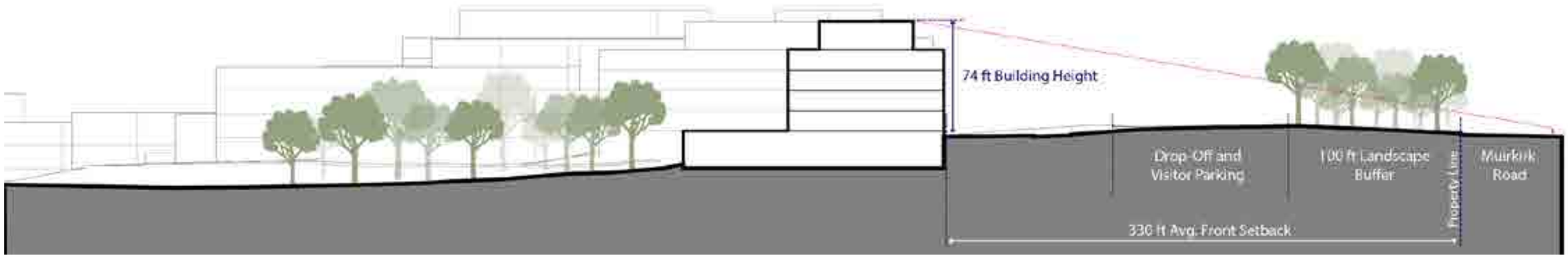


Figure 3-112: Alternative A security and environmental constraints

Visual Screening



A **A'**

Figure 3-113: Alternative A visual screening section

Figure 3-114: Alternative A section key plan

Alternative B: Dual Campus; Distributing development between two sites

Security & Environmental Constraints

LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- Parking Structure
- Stream Valley Buffer
- Primary Access
- Secondary Access
- Restricted Access
- Landscape Buffer (100 ft)
- Site Setback (164 ft)
- Outer Fence
- Anti-Ram Barrier
- Inner Fence
- Secured Area
- Primary Screening Entrance (Staff/Visitors)
- Potential Secured Entrance (Staff/Visitors)
- Building Stand-off (50 ft)

0 150 300 600 Feet

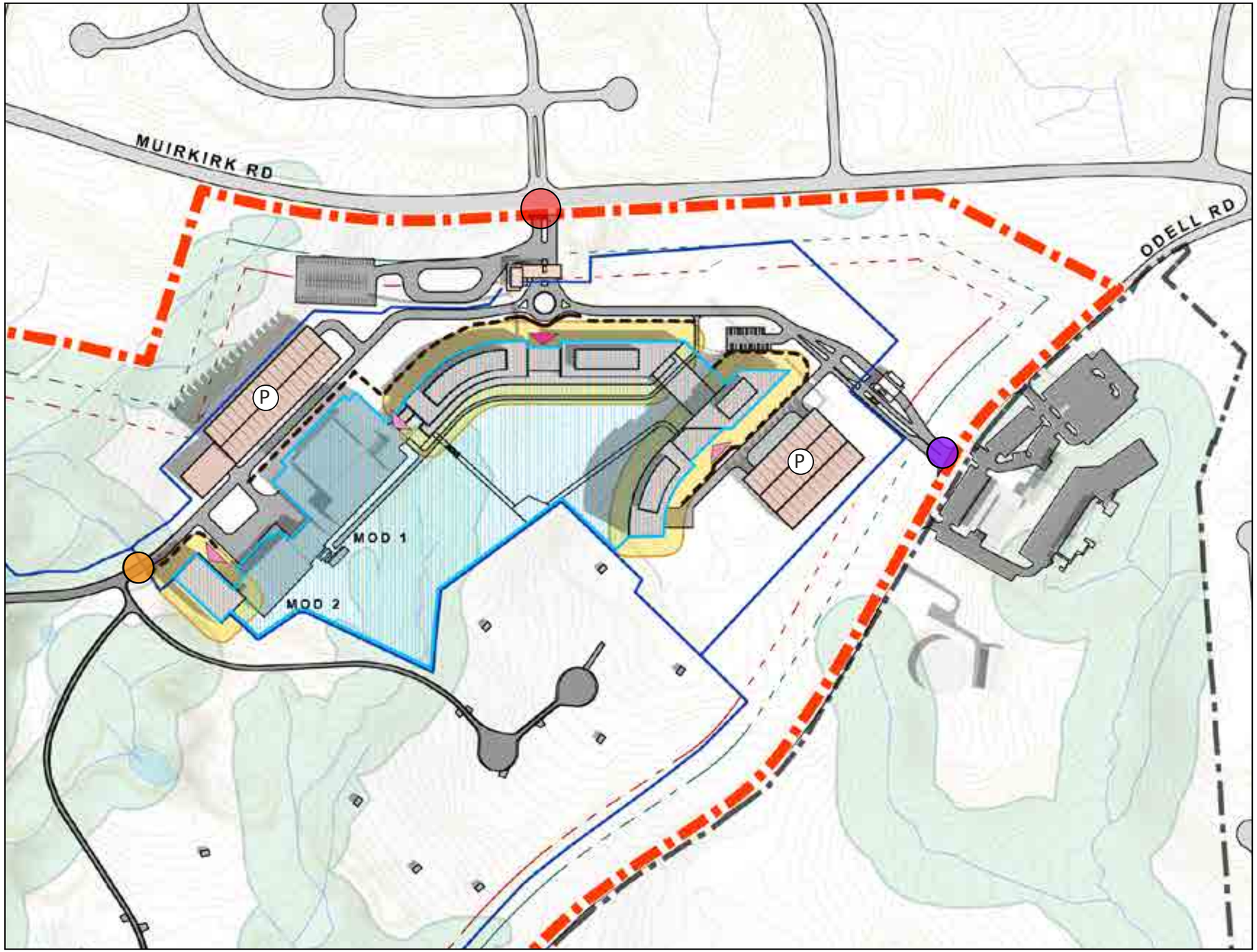
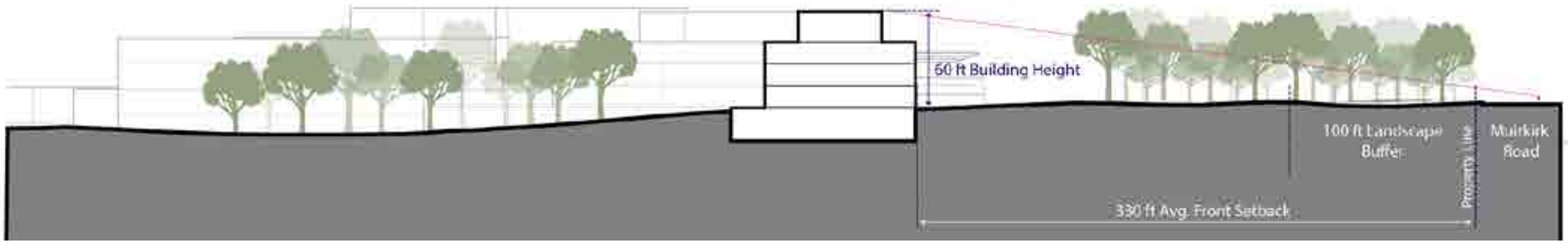


Figure 3-115: Alternative B security and environmental constraints



A A’

Figure 3-116: Alternative B visual screening section

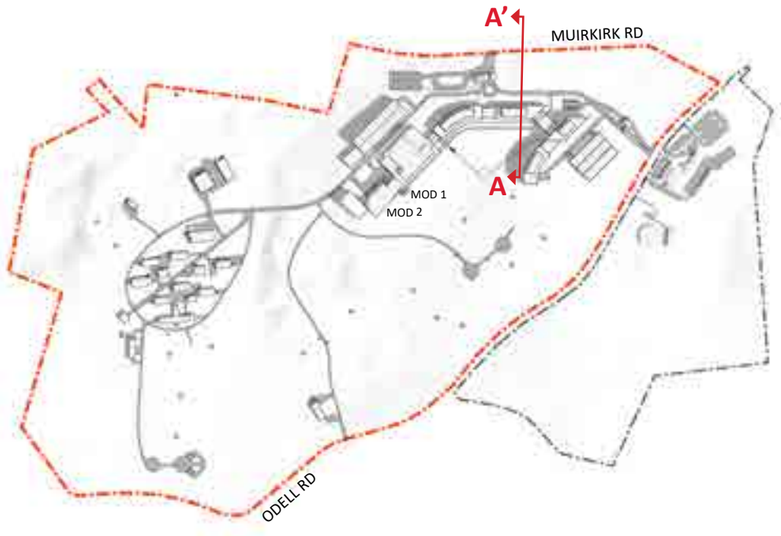


Figure 3-117: Alternative B section key plan

Alternative C: Northeast Campus; Reimagining the BRF

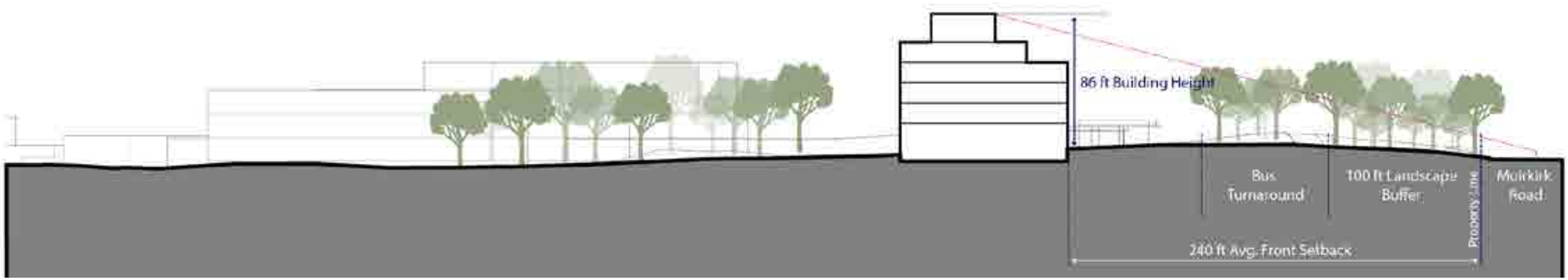
Security & Environmental Constraints

LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- Parking Structure
- Stream Valley Buffer
- Primary Access
- Secondary Access
- Restricted Access
- Landscape Buffer (100 ft)
- Site Setback (164 ft)
- Outer Fence
- Anti-Ram Barrier
- Inner Fence
- Secured Area
- Primary Screening Entrance (Staff/Visitors)
- Potential Secured Entrance (Staff/Visitors)
- Building Stand-off (50 ft)

0 150 300 600 Feet

Figure 3-118: Alternative C security & environmental constraints



A **A’**

Figure 3-119: Alternative C visual screening section

Figure 3-120: Alternative C section key plan

Ornamental Fencing Precedent Imagery

Figure 3-121: Ornamental fencing precedent imagery

4

ENVIRONMENTAL & HISTORICAL CONSIDERATIONS

4.ENVIRONMENTAL AND HISTORICAL CONSIDERATIONS

4.1 Historic Preservation

4.1.1 Area of Potential Effect

The APE as defined in the Code of Federal Regulations, Title 36, Part 800, Definitions (36 CFR 800.16), as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effect is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking."

The APE for the Muirkirk Road Campus Master Plan was determined by considering a number of potential impacts resulting from the expansion of the campus including short term construction activities, resources visually or physically affected directly or indirectly by the demolition and construction associated with the development, changes in traffic patterns, and other potential direct, indirect, and cumulative effects. The APE was determined to be contiguous with the boundaries of the approximately 197-acre MRC and the approximately 52-acre East Parcel and includes all resources that may be affected by the proposed undertaking. See Figure 4-3 for a map of the APE

4.1.2 Historic Resources in the APE

Previous historic and archaeological surveys of the MRC found no historic resources on the MRC and East Parcel. To determine if there are historic resources within the APE, a DOE for the landscape and built resources of the MRC and East Parcel was submitted to MHT on February 4, 2021. The DOE evaluated the property under Criteria A, B, and C in relation to historic contexts established in the statewide *Maryland Preservation Plan* (2005), and in the M-NCPPC's *Illustrated Inventory of Historic Sites and Districts*, *Prince George's County, MD* (2011), and *African-American Historic and Cultural Resources in Prince George's County*, MD (2012). Relevant contexts from those documents are: Agriculture/Agricultural Heritage (Criterion A), Economy/Industry (Criterion A), African American Heritage (Criterion A), Federal Presence (Criterion A), and Architecture/Community Planning (Criterion C). On March 4, 2021, MHT concurred with the DOE's findings that the MRC and East Parcel are not eligible for listing in the NRHP.

A Phase I Archaeological Survey of the MRC and East Parcel was submitted to MHT on January 27, 2021. The investigation documented moderate to extensive disturbance from nineteenth and/or early twentieth century mining activities in the southern and western portions of the MRC, but no historic resources potentially eligible for the NRHP. The survey identified one newly inventoried potentially eligible site, 18PR1198, on the East Parcel which consists of a moderate scatter of precontact lithics and three artifacts indicating short term use of the site by

Figure 4-1: View from southern entrance gate looking north at MOD 1 and MOD 2

Figure 4-2: BRF building entrance

people from approximately 6,200 to 2,500 years ago. MHT concurred with the findings of the Phase I Archaeological Survey on March 4, 2021.

4.1.3 Approach to Historic Resources in the APE

As documented in the DOE and Phase I Archaeological Survey, there are no historic resources on the MRC, therefore no historic properties within the APE will be affected by the planned construction under the Master Plan.

The East Parcel is not part of the proposed development associated with this Master Plan. If future development plans (outside the scope of this Master Plan) include disturbance of the inventoried site on the East Parcel, Phase II archaeological investigations are warranted to conclusively evaluate the site's eligibility for the NRHP. The Phase II investigations may include determining whether use of the site was a single or multiple short- or long-term occupation, if features or intact deposits are present, and if the occupation is significant enough to qualify the site for listing in the National Register of Historic Places under Criterion D.

At the request of MHT, permanent plans to store and curate the artifacts collected during the Phase I Archaeological Survey in accordance with applicable federal standards (36 CFR Part 79) will be part of the project development.

In accordance with Section 106 of the NHPA, GSA and FDA initiated consultation with the MHT and consulting parties, which was carried out in coordination with the EIS under the NEPA.

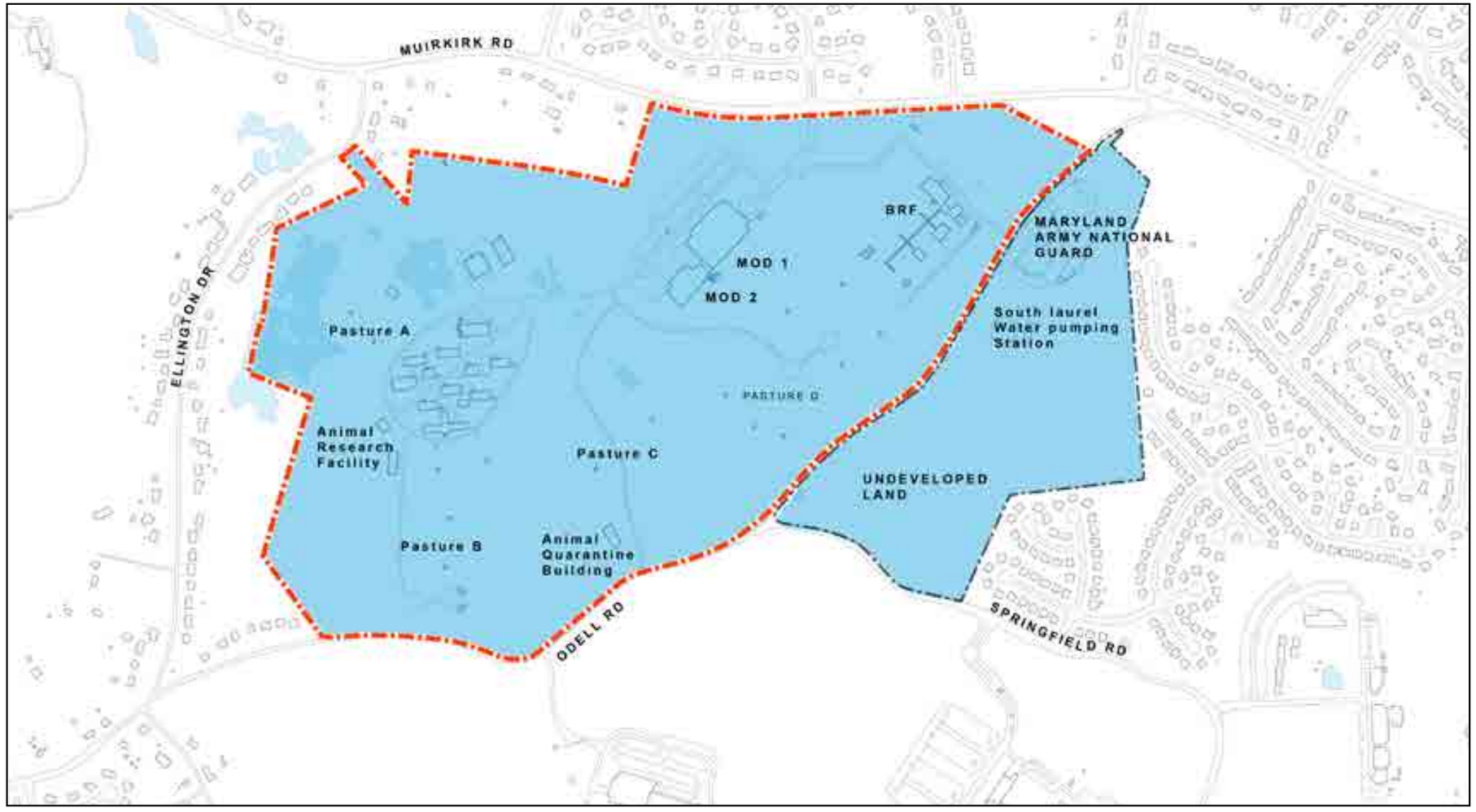


Figure 4-3: Area of potential effect

4.2 Natural Resources

4.2.1 Soils and Topography

Implementation of the Master Plan will require clearing and grading for the construction of new buildings, parking garages, bike paths, walking paths, and utilities that would impact soils and the existing topography. Grading for the new facilities may require leveling of the existing rolling topography and coverage of soils by buildings and other infrastructure. Trenching of soils would be required to install underground power, communications, water, and sewer lines.

Demolition of buildings and roads will expose soils. Excavation for the construction of buildings, parking garages, bike paths, walking paths, and utilities would permanently remove soils under each alternative. Alternative C is the least impactful to steep slopes and soils, as new buildings are proposed to the greatest extent within the existing footprint of the BRF. Mitigation measures, such as retaining walls, would be required to stabilize slopes during construction. After construction, the new buildings and retaining walls, if needed, would minimize the potential for future erosion and slope failure. Prior to construction, site-specific geotechnical investigations would be conducted to determine if soils with severe erosion potential are present; if found, these deposits would be assessed for their potential to impact the below-grade construction from shrinking or swelling. Additional soils may need to be removed to construct a stable foundation and to provide appropriate soil stability. Removal of soils is not anticipated to have severe adverse impacts on ecosystem functions.

See Table 4-1 for the acreage and steep slopes impacted by the Action Alternatives, and Table 4-2 for soils exposed during demolition and soils removed for below-grade construction.

Construction of new buildings, parking garages, bike paths, walking paths, and utilities would impact 1.5 acres of steep slopes under Alternative A, 1.4 acres under Alternative B and 1.2 acres under Alternative C, resulting in possible soil erosion. Alternative C is the least impactful to steep slopes, as new buildings are proposed to the greatest extent within the existing footprint of the BRF. Mitigation measures, such as retaining walls, would be required to stabilize slopes during construction. After construction, the new buildings and retaining walls, if needed, would minimize the potential for future erosion and slope failure. Prior to construction, site-specific geotechnical investigations would be conducted to determine if soils with severe erosion potential are present; if found, these deposits would be assessed for their potential to impact the below-grade construction from shrinking or swelling. Additional soils may need to be removed to construct a stable foundation and to provide appropriate soil stability.

A construction plan will need to be developed, incorporating the necessary measures to stabilize steep slopes. Construction on steep slopes can result in erosion of soils and sedimentation into local streams and stormwater networks. To avoid any risk of erosion, geotechnical engineering studies will be undertaken prior to design and construction to ensure that sound construction practices are followed. Suitability of soils for construction will be determined during final design, including appropriate building foundation specifications. To account for construction in areas with severe erosion potential, soil stabilization measures will need to be implemented. An erosion and sediment control plan will be developed in accordance with MDE and Prince George's County requirements and submitted to these agencies for approval. This plan aims to minimize sediment transport offsite. BMPs, such as silt fencing, construction sequencing, and seeding of exposed soil areas with grass seed, will be used to control and minimize sedimentation into the streams, wetlands, and associated buffers.

Prior to construction, FDA will need to obtain all necessary permits and comply with the requirements and guidelines set forth in those permits to minimize adverse impacts. Construction contractors would be required to implement and maintain these erosion and sediment control measures until construction is complete and vegetation has been established.

Alternative	Additional Acres Impacted	Acres of Steep Slopes Impacted	Total Acres Impacted
Alternative A	22.7	1.5	24.3
Alternative B	22.5	1.4	24.0
Alternative C	20.2	1.2	21.5

Table 4-1: Acreage and steep slopes impacted by the Action Alternatives

Alternative	Soils Exposed During Demolition (ac)	Soils Removed for Below-Grade Construction (cy)
Alternative A	7.8	48,000
Alternative B	7.4	67,000
Alternative C	5.2	23,000

Table 4-2: Acreage and steep slopes impacted by the Action Alternatives

Alternative	Wetland Impacts (ac)		Wetland Buffer Impacts (ac)		Streams (WUS) (lf)	
	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent
Alternative A	0.17	0.05	0.07	0.05	246	246
Alternative B	0.06	0.03	0.07	0.01	0	0
Alternative C	0.17	0.05	0.18	0.04	68	68

Table 4-3: Impact for wetlands, wetland buffers, and streams

4.2.2 Groundwater & Hydrology

Construction will increase the impervious area within at the MRC. Demolition of buildings will not directly impact groundwater under the Action Alternatives. However, new construction can intercept the groundwater table. If the water table is intercepted, it may result in a release of groundwater and a reduction in groundwater level, but it will not affect the overall groundwater table in the region.

Implementation of the Master Plan will result in a minor, long-term, adverse impact to groundwater because construction of underground portions of the buildings can intercept the groundwater table but will not affect naturally occurring groundwater levels. There will be the potential for intrusion of groundwater from the groundwater table into the underground areas of the buildings which can affect building operations. As part of the building design process, stormwater and groundwater conditions on the building site will need to be verified, and the design will mitigate for potential groundwater intrusion. With the appropriate building design, the long-term adverse impacts to buildings from potential groundwater infiltration will be minor.

An increase in impervious surface, will reduce the available area for groundwater recharge. However, any increase would be a relatively small percentage of the impervious surfaces in the Upper Beaverdam Creek River Watershed. It would not noticeably affect the overall groundwater recharge within the sub-watershed. The Action Alternatives include the installation of infiltration devices such as landscaped areas and reforestation that provide pervious surface within the MRC (see Section 4.7.4). The Action Alternatives will result in minor, long-term, adverse impacts to groundwater as the increase in impervious surfaces account for a small percentage of the impervious surface in the watershed. The impacts would have a slight, but detectable effect on groundwater recharge.

4.2.3 Water Resources and Wetlands

Implementation of the Master Plan will require the clearing of vegetation, site grading, and other construction activities which impact water resources. Construction activities will temporarily impact wetlands and stream buffers. During construction, BMPs such as silt fence, erosion matting, sediment traps, sediment basins, and revegetation of exposed sediment would be implemented to minimize soil erosion and stormwater pollution into adjacent streams or wetlands. Stormwater management plans and erosion and sediment control plans will need to be prepared and submitted to MDE for review and approval prior to construction. Any construction that would temporarily impact wetlands, wetland buffers, and waterways, would require authorization under Section 404/401 of the CWA. It would also require authorization under Maryland's wetland and waterway regulations.

See Table 4-3 for the impacts on wetlands, wetland buffers and steams.

After construction is complete, the addition of elevated boardwalks will permanently impact water resource as piles would be driven into the wetlands and wetland buffers. To limit any long-term impacts, the elevated boardwalk would be constructed above any water resources. Section 404/ 401 of the CWA requires authorization for permanent impacts to wetlands and waterways. Permanent impacts to wetlands, wetland buffers, and waterways also require authorization under Maryland's Wetlands and Waterways Regulations.

After construction, all disturbed areas without buildings, walkways, roads, or parking garages will be permanently revegetated and stabilized to prevent further erosion of soils and runoff into streams and wetlands. Streams and wetlands will be restored to pre-construction conditions to the maximum extent practicable, including contour and elevation restoration, revegetation with native species, streambank stabilization, and stream substrate replacement.

Alternative	Temporary Lawn Impacts (ac)	Permanent Lawn Impacts (ac)	Permanent Canopy Impacts (ac)	Temporary PMA Impacts (ac)	Permanent PMA Impacts (ac)
Alternative A	5.3	3.5	4.8	0.9	0.2
Alternative B	4.9	3.5	5.2	0.3	<0.1
Alternative C	4.4	4.1	4.8	0.6	0.1

Table 4-4: Vegetation impacts by Alternative

	No-Action Alternative	Alternative A	Alternative B	Alternative C
Additional Impervious Cover (ac)	0.0	9.7	12.0	9.5
Existing Impervious Surface to be Removed (ac)	0.0	6.9	6.4	4.7
Net Increase of Impervious Surface	0.0	2.8	5.6	4.8
Total Impervious Cover (ac)	19.7	22.5	25.3	24.4
Percentage Increase for the Entire MRC	0.0%	1.4%	2.8%	2.4%
Total Percentage of Impervious Surface	<10%	11.4%	12.8%	12.4%

Table 4-5: Impervious surface by Alternative

	Structures (ac)	Pedestrian Paths/Elevated Boardwalks (ac)	Roads/ Parking (ac)	Total (ac)
Alternative A	6.6	1.6	4.7	12.9
Alternative B	8.2	1.4	5.2	14.8
Alternative C	6.9	1.4	6.1	14.4

Table 4-6: Total impervious areas by Alternative within the study area

Implementation of the Master Plan will increase the impervious surface area as well as the volume and temperature of stormwater runoff. In turn, this will increase peak discharges, temperatures, and pollutant load in the receiving stream(s) or wetland(s), reducing water quality and degrading the biological integrity of streams and wetlands both on and offsite. These long-term, adverse impacts can be minimized by applying BMPs, such as silt fencing, stabilized construction entrances, erosion matting, and sediment traps, and vegetative stabilizations and appropriate stormwater management. Stormwater management plans and erosion and sediment control plans will need to be prepared and submitted to MDE for review and approval prior to construction of each phase.

4.2.4 Vegetation

Under all the Acton Alternatives, most development activity will occur within areas designated by Anderson et al 1976 as Urban or Built-Up Land. Construction of buildings, parking garages, roadways, bike paths, walking paths, and utilities under would result in permanent impacts to lawns, tree canopy, and PMAs.

Table 4-4 provides the amount of temporary and permanent lawn, canopy, and PMA impacts per Action Alternative.

Construction activities will be limited to the areas where buildings, roadways, utilities, parking garages, surface parking, and elevated boardwalks are to be constructed. If any additional clearing or grading is required for construction activities outside of these areas, the affected areas would be restored to pre-construction conditions. This includes replanting of trees, revegetating with appropriate seed mixes, and replacing invasive species with native ones in accordance with local and State requirements. Clearing for construction will result in moderate, short-term, adverse impacts which would be minimized as much as possible by tree protection fencing, matting to prevent soil compaction, protecting root zones of trees not to be removed and other BMPs.

The elevated boardwalk under Alternatives A and C would meander through the forested area between the MOD 1 and MOD 2 site and the BRF site. Elevating the boardwalk reduces the long-term impacts. The boardwalk will be designed to minimize tree removal, but some trees would need to be removed to accommodate the boardwalk. The elevated boardwalk under Alternative B would be rectilinear and connect MOD 1 to the new buildings at the BRF site. The long-term adverse impacts to vegetation for each of the Action Alternatives are expected to be moderate because there would be a noticeable change in vegetation, but with mitigation the impact would not rise to a significant level.

Most of the other impacts under Alternatives A and B would occur in existing lawn areas at MOD 1 and MOD 2 and the BRF. Alternative C would be limited to the existing lawn areas at the BRF. Some impacts concern the forest edge and portions of the forest would be removed. Although the Action Alternatives will require removal of vegetation, fragmentation of forested areas will be avoided and large, contiguous areas of vegetation will remain untouched. The minor, long-term adverse impacts can be further minimized using BMPs for tree protection in forested areas, including tree protection fencing and root pruning for trees with critical root zones within the construction area. A Woodland Forest Conservation Plan will need to be developed to comply with the Prince George's County Woodland Protection and Planning Law (PG Co. Code Section 5B-119). The plan also needs to outline compensatory mitigation, to offset any loss of vegetation. Any trees removed need to be replaced according to NCPC, State of Maryland, and Prince George's County requirements.

4.2.5 Wildlife

Vegetation and tree removal for construction of new buildings, parking garages, bike paths, walking paths, and utilities will result in a loss of habitat for terrestrial wildlife within the study area. Trenching for installation of utilities would similarly disturb habitat. Large wildlife species currently inhabit the MRC such as raccoons, groundhogs, and white-tailed deer. These areas would be fenced off from construction zones. However, it should be noted that white-tailed deer can jump fences and may become trapped within the construction zones. Smaller species, like the eastern gray squirrel and birds, will likely avoid construction areas. In addition, development would occur outside the roosting periods for the northern long-eared bat. Construction noise will disturb wildlife. Once construction is completed, impacts to wildlife from noise would decrease. There would be a slight, but detectable, effect on wildlife from noise and displacement during construction, resulting in minor, short-term, adverse impacts.

Once construction is complete, there will be permanent removal of habitat where the buildings, roads, and other improvements have been constructed. Large animals such as raccoons, groundhogs, and white-tailed deer will be impacted more than small animals by the reduction of habitat due to their need for greater resources. However, the impacts are not expected to affect the natural wildlife population levels. Smaller species could use the remaining habitat within the MRC. Additionally, landscaping included as part of design and tree replacement would provide habitat for smaller mammals and bird species. Although habitat loss would be measurable and slightly detectible, construction and operation of new facilities and associated improvements would not affect the natural range of wildlife population levels. There will be sufficient remaining habitat in the surrounding areas to provide for displaced species after construction. Therefore, the Action Alternatives are expected to result in minor, long-term, adverse impacts to wildlife from habitat loss.

Removal of forest can impact migratory birds that may be using these areas for nesting or foraging. However, there is similar habitat on the outer perimeter and on the East Parcel that can serve migratory birds. With the mitigation measures described below, the Action Alternatives will have minor, short- and long-term adverse impacts on migratory birds.

Construction of new buildings, parking garages, bike paths, walking paths, and utilities will result in an increase in impervious surface. This increase in impervious surfaces can result in increased stormwater flows, soil erosion, and water quality degradation that, in turn, would affect aquatic wildlife. Implementation of permanent stormwater controls would minimize stormwater runoff and potential water quality degradation of the stream. With mitigation measures, the Action Alternatives will have minor, short- and long-term adverse impacts on aquatic wildlife.

Animals at the Animal Research Facility would continue to graze on pasture lands south of the study area. As they are today, these animals will be protected from interaction with employees and visitors by an 8-foot interior chainlink fence.

Construction fencing will protect wildlife from entering active construction areas. Larger wildlife species would be removed from the construction zone prior to installation of a fence to prevent isolating animals within the fenced area. Landscaping with native species and with species that provide habitat and food sources such as sumac (*Rhus sp.*), serviceberry (*Amelanchier sp.*), and elderberry (*Sambucus canadensis*) can mitigate for habitat loss. Other plantings could include evergreen species to provide additional shelter for wildlife species. Deer-resistant landscaping should be considered to mitigate impacts from grazing white-tailed deer and compensatory mitigation can replace habitat lost over the long-term.

To minimize potential impacts to migratory birds, a pre-construction survey will be performed to determine the presence of nests of migratory birds. If nests are identified, FDA will need to avoid vegetative clearing during the nesting period for those species. Trees removed for construction would be replaced to provide long-term mitigation for impacts to migratory bird habitat.

Compliance with the approved erosion and sediment control plan will also minimize impacts to aquatic biota by controlling sedimentation. Areas of forest

that provide habitat and movement corridors for wildlife will be maintained to minimize impacts to wildlife. Any trees less than 10-inches in diameter that need to be removed will need to be replaced at a 1:1 acre ratio on the site.

Overall, habitat loss may place stress on wildlife populations that would be slight, but detectable. Therefore, the Action Alternatives will result in minor, long-term, adverse impacts to wildlife.

4.2.6 Stormwater Management

As described above, the implementation of the Master Plan will impact the groundwater at the MRC because of the change in impervious surface during and after construction. The increase in impervious surfaces is summarized in Table 4-5 and Table 4-6.

A larger impervious surface could result in increased stormwater flows, soil erosion, and water quality degradation. Installation of permanent stormwater controls will minimize stormwater runoff and potential water quality degradation of the stream from implementation of the Master Plan. Specific stormwater controls may be needed to reduce runoff potential for slope failure as well as water infiltration into buildings. With mitigation, the impacts to stormwater from construction activities would be slightly detectible. Alternative A would result in minor, short-term, adverse impacts from stormwater. See also the mitigation measures described below.

Permanent BMPs and Environmental Site Design (ESD) strategies are proposed to reduce the amount of stormwater, sediments, and pollutants entering streams and wetlands. The proposed MD ESD treatment area includes 50 percent of green roofs (1.2 acres) and 36,500 sf of micro-bioretention and bioswales. The increase in impervious surface likely to occur would result in a minor, long-term, adverse impact.

Stormwater quantity and quality control measures will need to be designed and implemented in accordance with the regulations, permits and guidance documents found in in the Table 4-7 below.

The MDE NPDES MS4 permit requires an impervious area restoration work plan for sites with 10 percent or more impervious area. FDA will be required to reduce or treat 20 percent of its existing impervious area, outside of the limits of the new development at the MRC.

Within the limits of the new development, State of Maryland ESD strategies will need to be implemented to the maximum extent practicable. Structural practices would be used only where necessary. Once ESD requirements are met, the project will also need to comply with water quality volume, groundwater recharge, and channel protection volume requirements. LEED® and SITES™ points for stormwater management will be pursued for each building. LID strategies will follow the Technical Guidance on Implementing the Stormwater Runoff requirements for Federal Projects under Section 438 of the EISA. LID and ESD methods both utilize the same BMPs; however, slightly different calculations are used during design to verify compliance with standards.

Strategies to incorporate stormwater management into the site as amenities and spatial drivers will be pursued, as well as strategies to explore the potential for integration of design and the natural systems at the MRC. Stormwater runoff would be conveyed to new non-structural ESD/LID/BMP facilities. Once ESD measures have been implemented to the maximum extent practicable, structural BMP facilities may be utilized. Stormwater management would mostly be provided in the form of bioswales along the roads, micro-bioretention facilities scattered throughout the site. Walled micro-bioretention would be implemented in areas around the garages where standard micro-bioretention does not work. Pervious pavements may also be utilized in some locations such as fire lanes, sidewalks, paths, and other hardscape areas. Steep slopes adjacent to the proposed development may limit the use of micro-bioretention (see Figures 3-110). Instead, structural BMPs may have to be utilized.

Office buildings will maximize the use of rooftop rainwater harvesting as well as green roofs (see Figure 3-109). A green roof with 4-inch media, for example, provides 38 percent of the required ESDv. Rooftop rainwater capture and reuse will be utilized where feasible. Typical reuse methods are toilet flushing and cooling tower makeup water. FDA may have other possible uses for captured rainwater onsite. Roadways will maximize use of bioswales. Pervious pavements may also be utilities in some locations as fire lanes, sidewalks, paths, and other hardscape areas.

The stormwater management facilities will drain to new storm pipe systems that outfalls to existing tributaries of Beaverdam Creek. Outfalls would be required to be non-erosive. Storm drain piping will need to be reinforced concrete pipes (RCP) or high-density polyethylene (HDPE) pipes. Due to space limitations, the necessary quantity control may require an underground system. This underground facility could be utilizing one of the following:

- Pipes (Corrugated Metal Pipe (CMP) or HDPE)
- Perforated pipes (CMP or HDPE) in a gravel bed
- Box culverts
- Concrete vaults
- Many different available manufactured products

A NOI will be filed and NPDES General Permits for construction will be required for all new work. During construction, BMPs such as silt fence, erosion matting, inlet protection, sediment traps, sediment basins, and revegetation of exposed sediment will need to be implemented to minimize soil erosion and stormwater pollution. Stormwater management plans and sediment and erosion control plans will need to be prepared for all the new work on site and submitted to MDE for review and approval prior to the construction of each phase. To meet the MDE requirements, only 20 acres of ground may be disturbed at any time. All disturbed areas will need to be permanently revegetated and stabilized following construction. Streams and wetlands will need to be restored to pre-construction conditions to the maximum extent practicable, including contour and elevation restoration, revegetation with native species, streambank stabilization, and stream substrate replacement.

A downstream analysis will be required to determine whether Overbank Flood Protection (10-year storm) or Extreme Flood Protection (100-year storm) need to be addressed. Initial research and analysis indicate that providing attenuation at the MRC would not provide benefits as far downstream as the current areas of flooding.

Until construction is complete, vegetation has been established, and permanent stormwater controls are in place, construction contractors will be required to implement and maintain these erosion and sediment control measures.

4.2.7 Noise

The Master Plan would alter traffic volumes and patterns. The potential for these changes to exceed FHWA-established noise abatement criteria and MDOT SHA Noise Abatement Policy criteria was analyzed. Traffic volume data was compared for all roadway segments to determine if noise-sensitive (primarily residential) areas would experience the growth in traffic volumes significant enough to result in traffic noise increases. Traffic as a result of implementation of the Master Plan is anticipated to cause imperceptible increases in noise. The traffic increases anticipated with development under the MRC Master Plan would be much smaller than a doubling (or 200 percent increase) of traffic volumes at full build out.

Construction noise is composed of the noise generated during the development of the proposed roadways that are part of the project and noise generated by demolition as well as the construction of the proposed buildings. During construction noise would primarily be due to heavy equipment noise. As with any major construction project, areas around the construction site are likely to experience varied periods and degrees of noise. With multiple pieces of equipment operating concurrently, noise levels can be relatively high during daytime periods at locations within several hundred feet of the MRC. Construction activities would be confined primarily

to daytime hours and would be subject to Prince George's County noise regulations. Noise at nearby sensitive receptors might be clearly audible but would only be temporary. As part of the building permitting process, the applicant would ensure in writing that the planned construction would comply fully with the limitations established by the noise regulations. Operation of the new facilities at the MRC would increase noise levels, but these increases would be imperceptible, or barely perceptible, to human ears.

4.2.8 Coastal Zone Management

The Master Plan would be undertaken in a manner consistent with the policies of the Maryland Coastal Zone Management Program. A Federal consistency determination was submitted to MDE and is included in Appendix A. A summary of the Master Plan's consistency with the enforceable policies of the Maryland Coastal Zone Plan is provided in Table 4-8.

4.2.9 Waste Management

Solid waste would be generated from demolition, excavation, and construction. Construction waste could include building components and structures, concrete, asphalt, wood, metals, roofing, flooring, and piping. All new buildings on the campus would be, at a minimum, LEED® Gold certified as required by GSA. In accordance with these requirements, a minimum of 50 percent of demolition and construction waste would be diverted from landfills during implementation of the Master Plan (GSA, 2020). Building materials, products, and supplies would be reused or recycled to the maximum extent practicable. All remaining construction waste would be disposed at a nearby landfill, which would result in temporary increases in construction waste.

The increase in population at the MRC would generate additional solid waste, food waste, and recyclable materials. This would increase the amount of waste handled at waste-receiving facilities. General waste would be transported either to the Brown Station Road Sanitary Landfill. As mandated by EO 13990, the Master Plan would be implemented in accordance with CEQ's Guiding Principles for

Regulation, Permit, or Guidance	Applicable Requirements
COMAR 26.17.01 Erosion and Sediment Control	Erosion and sediment control plans will need to be prepared and submitted to MDE for review and approval prior to construction. During construction, BMPs such as silt fence, erosion matting, inlet protection, sediment traps, sediment basins, and revegetation of exposed sediment would be implemented to minimize soil erosion and stormwater pollution.
COMAR 26.17.02 Stormwater Management	Stormwater management plans will need to be prepared and submitted to MDE for review and approval prior to construction. Within the limits of the new development, Maryland Environmental Site Design (ESD) strategies would be implemented to the maximum extent practicable (MEP). MDE will only allow a maximum of 20 acres of ground be in a disturbed condition at any time.
Maryland Standards and Specifications for Soil Erosion and Sediment Control (MDE, 2011)	Erosion and sediment control plans will need to be prepared in accordance with these standards.
Maryland Stormwater Management and Erosion & Sediment Control Guidelines for State and Federal projects (MDE, 2015)	Stormwater management plans will need to be prepared in accordance with these standards.
Maryland Stormwater Design Manual, Volumes I & II (MDE, 2000) and Supplement 1 (MDE, 2009)	Stormwater management plans will need to be prepared in accordance with these standards.
Section 438 of the Energy Independence and Security Act of 2007 (EISA)	LID strategies will need to be employed in accordance with the Technical Guidance on Implementing the Stormwater Runoff requirements for Federal Projects under Section 438 of the EISA.
Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under EISA 438 (EPA, 2009)	Stormwater management design will need to comply with these requirements.
NPDES General Permit for Stormwater Associated with Construction Activity, administered by MDE	Once plan approval is received from MDE, a Notice of Intent (NOI) must be filed, and this general permit will need be obtained from MDE.
NPDES General Permit for Discharges from State and Federal Small Municipal Separate Storm Sewer Systems (MS4s), administered by MDE	Permit requires the development and implementation of an impervious area restoration work plan on sites where impervious area makes up 10 percent of the site or more. Expanded campus would be subject to the permit's many requirements including providing water quality treatment for 20% of the existing untreated impervious areas around the MRC site, outside the limits of the new development.
Prince George's County "Techno-Gram" (002-2019), 2019	100-year stormwater quantity control will be required, unless otherwise determined by the Prince George's County DPIE on a case-by-case basis.
NCPC's Federal Elements of the Comprehensive Plan for the National Capital, SECTION C: Policies Related to Water Resources and Stormwater Management	Federal government should reduce the amount of stormwater that flows into the sewer system and rivers; clean the stormwater that does flow into streams and rivers; increase regional infiltration rates and aquifer recharge; and reduce water consumption by reusing stormwater.

Table 4-7: Applicable stormwater management regulations, permits, and guidance documents

Alternative A: Compact Campus; Integrating old and new

Stormwater Management Plan

State of Maryland Environmental Site Design Treatment area to be provided: 1.2 ac green roof; 36,500 sf micro-bioretention & bioswale

Note: The diagrams shown here are high-level. A more detailed landscape plan will be prepared once a preferred alternative has been selected. At that stage, the Master Plan will further detail the proposed pervious pavement (fire lanes, sidewalks, paths, and other hardscape areas) and the use of porous and permeable pavements in the visitor parking lot and plazas.

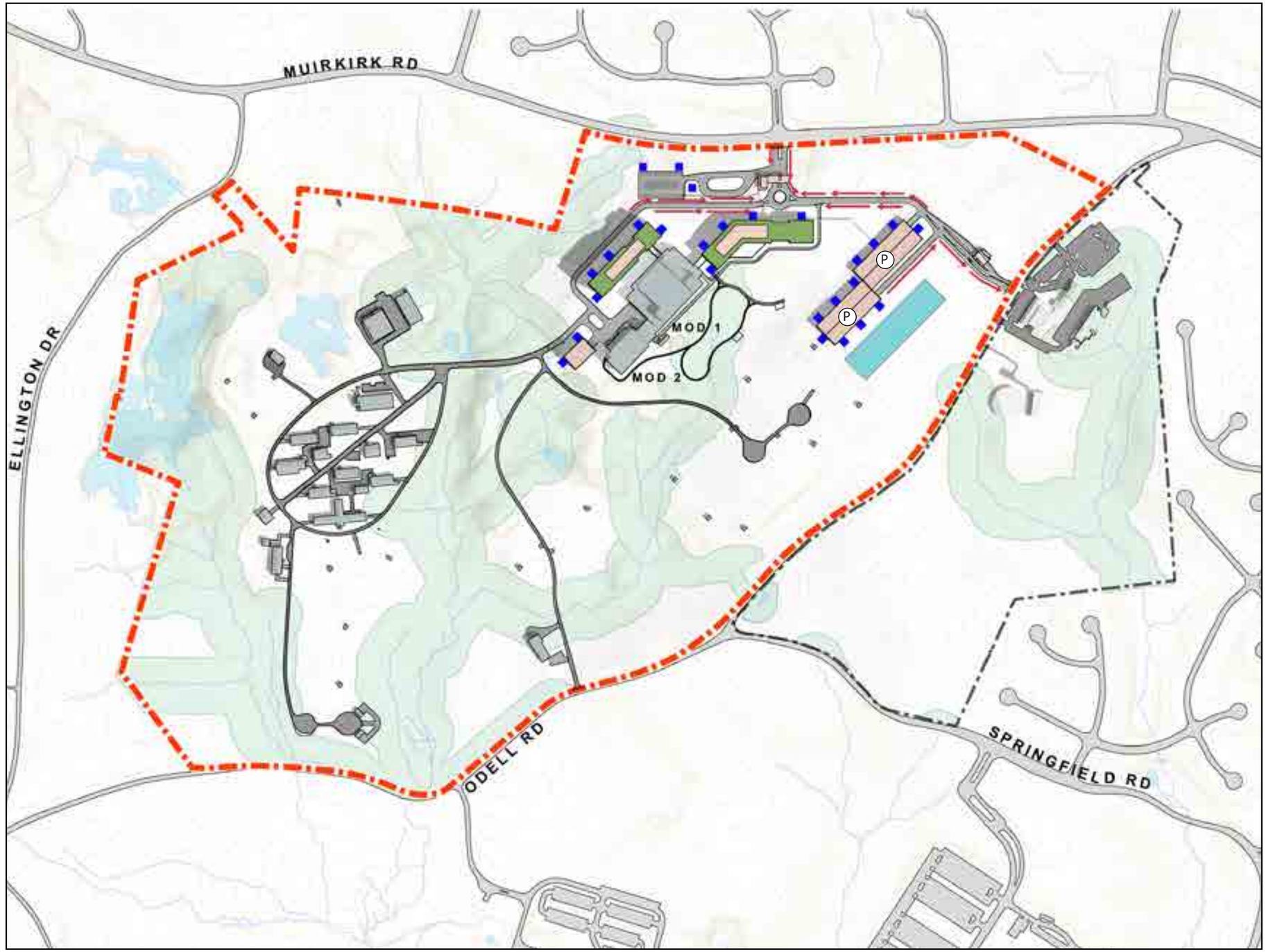


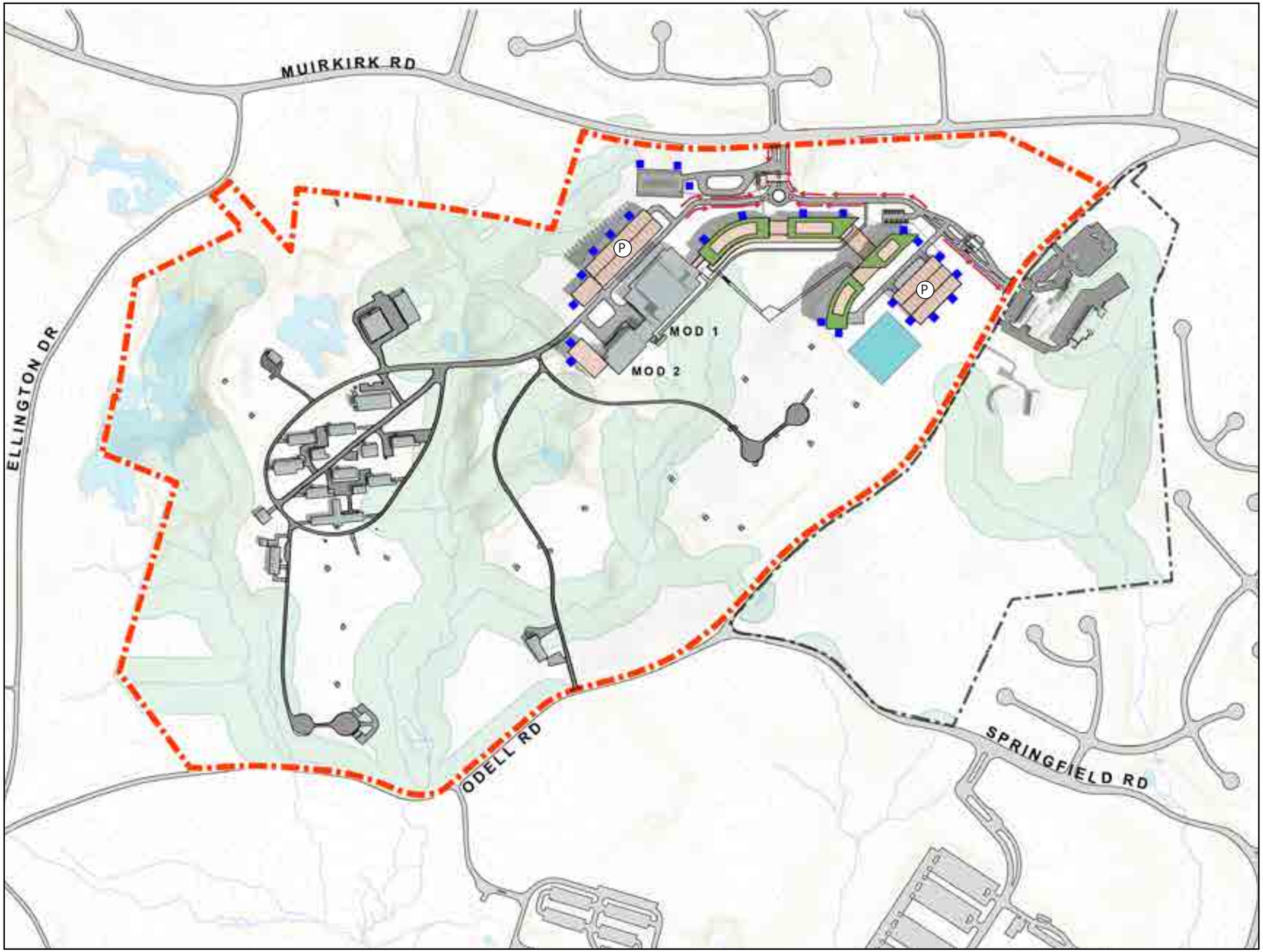
Figure 4-4: Alternative A stormwater management plan

Alternative B: Dual Campus; Distributing development between two sites

Stormwater Management Plan

State of Maryland Environmental Site Design Treatment area to be provided: 1.9 ac green roof; 50,600 sf micro-bioretention & bioswale

Note: The diagrams shown here are high-level. A more detailed landscape plan will be prepared once a preferred alternative has been selected. At that stage, the Master Plan will further detail the proposed pervious pavement (fire lanes, sidewalks, paths, and other hardscape areas) and the use of porous and permeable pavements in the visitor parking lot and plazas.



LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- (P) Parking Structure
- Stream Valley Buffer
- Bioswale
- Schematic locations for Micro-Bioretention Facilities
- Green Roof
- Underground SWM

0 150 300 600 Feet

Figure 4-5: Alternative B stormwater management plan

Alternative C: Northeast Campus; Reimagining the BRF

Stormwater Management Plan

State of Maryland Environmental Site Design Treatment area to be provided: 1.2 ac green roof; 47,600 sf micro-bioretention & bioswale

Note: The diagrams shown here are high-level. A more detailed landscape plan will be prepared once a preferred alternative has been selected. At that stage, the Master Plan will further detail the proposed pervious pavement (fire lanes, sidewalks, paths, and other hardscape areas) and the use of porous and permeable pavements in the visitor parking lot and plazas.

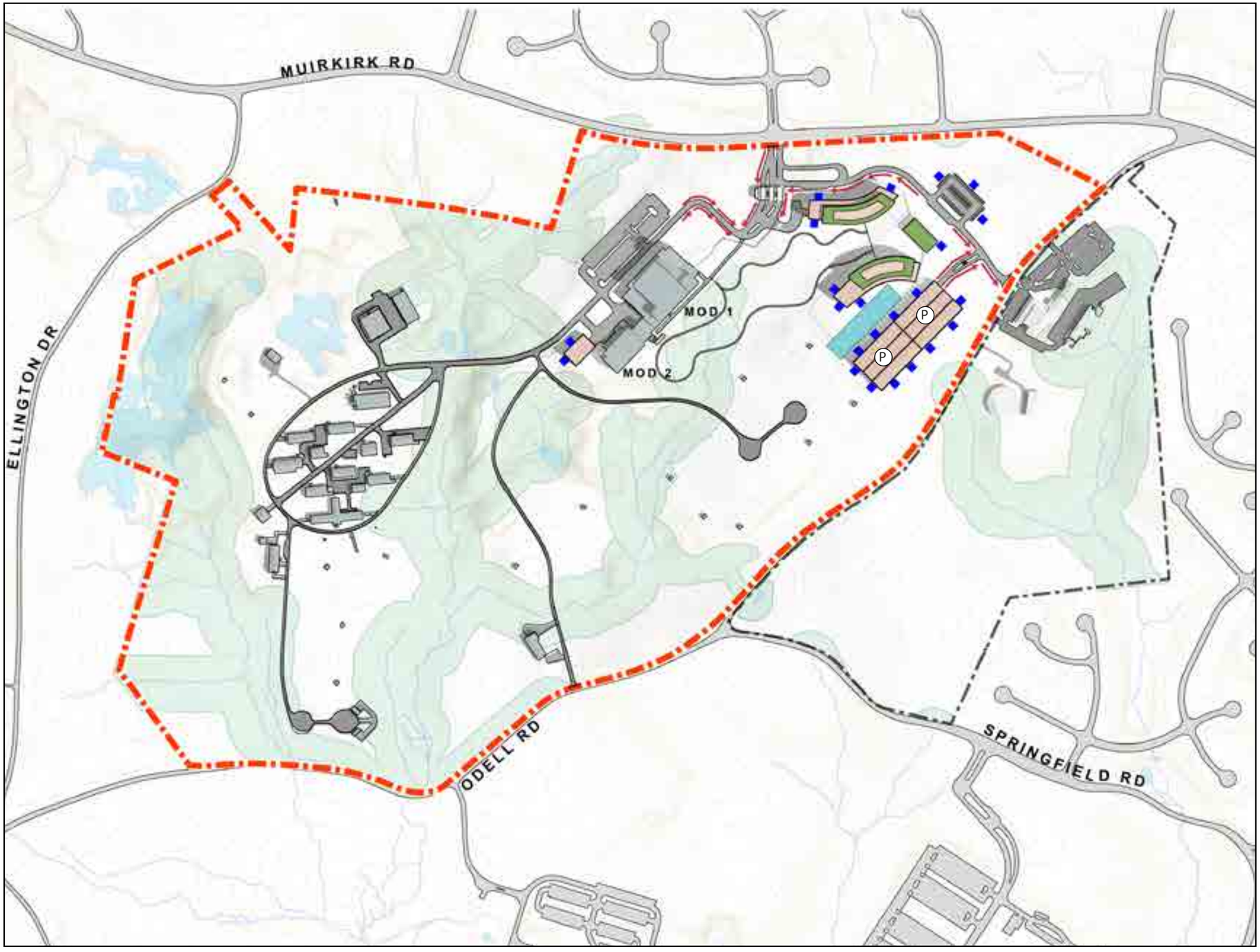


Figure 4-6: Alternative C stormwater management plan

Sustainable Federal Buildings (CEQ, 2020). Following construction, waste collection, recycling, and composting programs implemented by GSA would continue. At least 50 percent of non-hazardous waste would be diverted from landfills through reuse, recycling, and composting. To promote waste minimization and pollution prevention, the MRC would follow GSA's Green Purchasing Plan, which requires the purchase of products/ materials that are energy and water efficient, renewable energy technology, bio-based, non-ozone depleting, contain recycled content, and are non-toxic or less toxic alternatives (GSA, 2011).

4.2.10 Air Quality

The Master Plan will affect air quality in the area on a very small scale. Fugitive dust would be produced during construction, but it would minimal and not permanent. The fugitive dust that would be produced is not expected to travel far from the MRC site. Fugitive emissions would be mitigated using water sprays or other suppressants as needed. Because fugitive emissions would not be discernible, the Action Alternatives would result in a negligible, short-term, adverse impact.

Additionally, natural gas will be used to operate comfort heating within the new buildings. The combustion of natural gas does emit criteria pollutants, some toxic pollutants, and greenhouse gases. However, if the assumed comfort heaters were used continually throughout the year, the total emissions would be less than 5.2 tons of any criteria pollutant (less than 1.0 ton per year for most) and only 5,516 metric tons of CO_2e . In practicality, the heaters would not be used continually, and the actual emissions would be much lower. While there would be emissions from the Action Alternatives, the impact would not be discernable. Long term, adverse impact would be negligible.

The only stationary sources associated with the

[1]CO_2e is the carbon dioxide equivalent or the number of metric tons of carbon dioxide emissions with the same global warming potential as one metric ton of another greenhouse gas.

Policy		Consistency with Applicable Policies
General Policies		
Core Policy – Quality of Life	Policy 1 – Air Quality	Under the Action Alternatives, any impacts within the region from the mobile sources will be offset by the advancement in automobile technology and Federal emission regulations and controls. Therefore, the Action Alternatives are consistent, to the maximum extent practicable, with this policy.
	Policy 2 – Noise	The Action Alternatives will result in barely perceptible or imperceptible increases in noise. Therefore, MRC Master Plan is consistent, to the maximum extent practicable, with this policy.
	Policy 5 – Natural Character & Scenic Value of Rivers and Waterways	The project will result in impacts to a perennial stream. The project would have minimal effect to the natural character and scenic value of the stream; therefore, the Action Alternatives are consistent, to the maximum extent practicable, with this policy.
	Policy 9 – Public Outreach	Authorization under Section 404/401 of the CWA will be required for temporary impacts to wetlands, wetland buffers, and waterways. The project will also require authorization under Maryland's Wetland and Waterway Regulations. Implementation of the Master Plan will follow the requirements of permits; therefore, the MRC Master Plan is consistent with this policy.
	Policy 10 – Erosion & Sediment Control	Stormwater management plans and erosion and sediment control plans will be prepared and submitted to MDE for review and approval prior to construction. Therefore, the Action Alternatives are consistent with this policy.
Core Policy – Waste & Debris Management	Policy 1 – Hazardous Waste Management	Implementation of the MRC Master Plan may generate hazardous materials. All outgoing waste, including hazardous and biological wastes, will be collected in accordance with FDA's waste diversion requirements and disposed of in accordance with state and Federal laws. Therefore, the MRC Master Plan is consistent with this policy.
Core Policy – Water Resources Protection & Waste Management	Policy 1 – Pollution Discharge Permit	FDA maintains a NPDES General Permit for Discharges from State and Federal Small MS4s, administered by MDE. Prior to construction, FDA will obtain a NPDES General Permit for Stormwater Associated with Construction Activity, also administered by MDE. No other discharges would occur to waters of the State; therefore, the MRC Master Plan is consistent with this policy.
	Policy 2 – Protection of Designated Uses	The project will result in temporary stream impacts from the construction of a pedestrian boardwalk or walkway but would not affect the designated uses. Therefore, the MRC Master Plan is consistent with this policy.
	Policy 3 – Protection of Designated Uses	Toxic substances will not intentionally be released into waters of the State; therefore, the MRC Master Plan is consistent with this policy.

proposed project are natural gas fired heaters to be installed within the new buildings. The implementation of the Master Plan would produce a lower level of emissions and have minimal, long-term, adverse impact to air quality. All other stationary sources are already operational at MRC and are permitted accordingly.

In accordance with *USEPA Guidance on CO Hot Spot Analysis* (EPA, 1992), the potential for mobile source emissions to violate the NAAQS was evaluated by analyzing mobile CO emissions at a single intersection considered to be the worst-case scenario for potential emissions on nearby air quality sensitive receptors. The worst-case intersection was determined to be Muirkirk Drive and Laurel Bowie Road. Of the 13 intersections that were the focus of the 2021 Traffic Impact Study MRC Master Plan, this intersection was predicted to have the highest traffic volumes coupled with low levels-of-service (LOS). This intersection is anticipated to emit the highest CO concentrations. Intersection geometry modeled on future year traffic counts, and signalization characteristics of this intersection were input into USEPA's CAL3QHC pollutant dispersion model to estimate the worst-case, localized CO concentrations near locations likely to host air quality sensitive receptors, such as crosswalks and sidewalks. The mobile source analyses indicated that future traffic conditions at this intersection would not result in any exceedance of the 1-hour or 8-hour NAAQS for CO under any of the Action Alternatives.

The proposed action qualifies as a project that facilitates new development and may generate Mobile Air Source Toxic (MSAT) emissions from activities including new trips, truck deliveries, and parked idling vehicles (FHWA, 2016). However, these activities are attracted from elsewhere in the region. On a regional scale, there would be no net change in emissions. USEPA regulations for vehicle engines and fuels would cause overall MSAT emissions to decline significantly over the next several decades. Based on regulations now in effect, an analysis of national trends with USEPA's MOVES2014 model forecasts a combined reduction of over 90 percent in

Policy		Consistency with Applicable Policies
	Policy 4 – Pre-Development Discharge Permit	Prior to construction, FDA will obtain a NPDES General Permit for Stormwater Associated with Construction Activity, administered by MDE. No other discharges would occur to waters of the State; therefore, the MRC Master Plan is consistent with this policy.
	Policy 5 – Use of Best Available Technology or Treat to Meet Standards	Stormwater management plans and erosion and sediment control plans will be prepared and submitted to MDE for review and approval prior to construction. These plans would use techniques and approaches to ensure compliance with applicable water quality standards. Therefore, the MRC Master Plan is consistent, to the maximum extent practicable, with this policy.
	Policy – Control of Thermal Discharges	
	Policy 7 – Pesticide Storage	Pesticides will be stored in accordance with MDE requirements and any approvals for secondary containment would be obtained. Therefore, the MRC Master Plan is consistent with this policy.
	Policy 8 – Stormwater Management	Public involvement and outreach will be conducted as part of the NEPA process and during implementation of the MRC Master Plan; therefore, the MRC Master Plan is consistent with this policy.
	Policy 11 – Public Outreach	
Coastal Resources		
Non-tidal Wetlands	Policy 1 – Removal or Alteration is Generally Prohibited Unless There Is No Practicable Alternative, in Which Case, Impacts are First Minimized & Then Mitigated to Replace Ecological Values Lost	FDA will minimize impacts to wetlands to the extent practicable and obtain authorization to construct the walkway under Section 404/401 of the CWA and Maryland's Wetland and Waterway Regulations from MDE and the USACE. Additionally, stormwater management plans and erosion and sediment control plans would be prepared and submitted to MDE for review and approval prior to construction. Therefore, GSA has determined that the Action Alternatives are consistent, to the maximum extent practicable, with this policy.
Forests	Policy 1 – Projects Impacting More Than 40,000 Square Feet Must Generally Identify & Protect Habitat & Mitigate for Impacts	A Forest Conservation Plan will be developed to comply with Prince George's County Woodland Protection and Planning Law (PG Co. Code Section 5B-119); the Maryland State Forest Conservation Act (COMAR 8.19); and NCPC's Tree Preservation and Replacement Policies. Removed trees will be replaced in accordance with these policies. Therefore, Action Alternatives are consistent, to the maximum extent practicable, with this policy.

the total annual emissions rate for the priority MSAT from 2010 to 2050 while vehicle-miles of travel are projected to increase by over 45 percent. This would both reduce the background level of MSAT as well as the possibility of even minor, long-term, adverse impacts from MSAT emissions generated by the implementation of this Master Plan.

During the construction period, fugitive dust and particulate emissions would be mitigated via water and other dust suppressants, as necessary. Any long-term impacts within the region from the mobile sources would be offset by the advancement in automobile technology and federal emission regulations and controls. Employees would be encouraged to use public transportation, carpool, vanpool, or bicycle-to-work. Alternative "clean" fuels and non-polluting sources of energy would be used whenever possible. Strategies such as minimizing power generation requirements and using green building materials, construction methods and building designs would be used to the maximum extent practicable. In response to Air Quality Action Days, measures to temporarily reduce the generation of emissions that contribute to O_3 formation would be taken. Additionally, the natural gas heater usage will likely be limited during the summer months and when the weather is warmer.

4.2.11 Greenhouse Gases & Climate Change

Implementation of the Master Plan will contribute a small level of GHG emissions, which could contribute to climate change. However, climate change is a long-term event. Construction would create some temporary GHG emissions, but these negligible, adverse impacts would be localized and temporary. Long-term, the use of natural gas heating for building comfort and operating of small boilers/generators has the potential to contribute to climate change as well, but the impact to the surrounding air quality over the long-term would not be discernable, especially when compared to surrounding GHG sources within 10-miles of the MRC. The estimated potential for the project is less than 6,000 MMT of CO_2e annually, which is significantly less than for instance Prince

Policy		Consistency with Applicable Policies
	Policy 2 – Maintain Resource Sustainability & Prevent or Limit Clear-Cutting to Protect Watersheds	A Forest Conservation Plan will be developed to comply with Prince George's County Woodland Protection and Planning Law (PG Co. Code Section 5B-119); the Maryland State Forest Conservation Act (COMAR 8.19); and NCPC's Tree Preservation and Replacement Policies. Removed trees would be replaced in accordance with these policies. Therefore, Action Alternatives are consistent, to the maximum extent practicable, with this policy.
	Policy 6 – Sediment & Erosion Control in Non-Tidal Wetlands	Stormwater management plans and erosion and sediment control plans will be prepared and submitted to MDE for review and approval prior to construction that would minimize indirect impacts to wetlands from potential sedimentation. Therefore, GSA has determined that the Action Alternatives are consistent, to the maximum extent practicable, with this policy.
Living Aquatic Resources	Policy 1 – Protection of Rare, Threatened or Endangered Fish or Wildlife	A review of the USFWS' IPaC website determined that the federally threatened northern long-eared bat (*Myotis septentrionalis*) potentially exists within the study area (USFWS, 2021). In a letter dated January 27, 2021, MDNR responded that there are no official state or Federal records for listed plant or animal species within the study area. Development would occur outside the roosting periods for the northern long-eared bat and nesting periods for migratory birds. The Action Alternatives are consistent, tot the maximum extent practicable, with this policy.
	Policy 5 – Time-of-Year Restrictions for Construction in Non-Tidal Waters	The project will adhere to time-of-year restrictions, as required, for any in-stream construction in non-tidal waters. Therefore, the Action Alternatives are consistent with this policy.
	Policy 7 – Non-Tidal Habitat Protection & Mitigation	A Forest Conservation Plan will be developed to comply with Prince George's County Woodland Protection and Planning Law (PG Co. Code Section 5B-119); the Maryland State Forest Conservation Act (COMAR 8.19); and NCPC's Tree Preservation and Replacement Policies. Removed trees would be replaced in accordance with these policies. Therefore, Action Alternatives are consistent, to the maximum extent practicable, with this policy.
Coastal Uses		
Development	Policy 1 – Sediment & Erosion Control	Stormwater management plans and erosion and sediment control plans will be prepared and submitted to MDE for review and approval prior to construction. Therefore, FDA has determined that the Action Alternatives are consistent, to the maximum extent practicable, with this policy.
	Policy 2 – Erosion and Sediment Control Plan	
	Policy 3 – Stormwater Management	

George's County Landfill on Brown Station Road (58,430 metric tons CO_2e), FDA FRC at White Oak (75,117 metric tons CO_2e), and the University of Maryland (99,021 metric tons CO_2e) (EPA, 2021). Overall a minor, long-term, adverse impact to climate change would occur.

FDA will comply with BMPs outlined in Maryland regulations during construction, ensuring that there would be minimal temporary construction related GHG impacts. In conjunction with the state of Maryland Reduction Act, FDA would also reduce their carbon footprint by limiting the total number of new parking spaces to one parking space for every two employees and by promoting use of mass transit and carpooling. See the EIS for a more detailed description of strategies to achieve a reduction of the FDA's carbon footprint and the TMP for ways in which FDA reduce the use of SOVs.

Policy		Consistency with Applicable Policies
	Policy 4 – First Avoid then Minimize Wetland Impacts, Minimize Water Quality, Habitat & Forest Damage & Preserve Cultural Resources	FDA will minimize impacts to wetlands to the extent practicable and would obtain authorization to construct the walkway under Section 404/401 of the CWA and Maryland's Wetland and Waterway Regulations from MDE and the USACE. Additionally, stormwater management plans and erosion and sediment control plans would be prepared and submitted to MDE for review and approval prior to construction. Therefore, GSA has determined that the Action Alternatives are consistent, to the maximum extent practicable, with this policy.
	Policy 5 – Proposed Development Projects Must Be Sited Where Adequate Water Supply, Sewerage and Solid Waste Services & Infrastructure Are Available	Coordination with local utilities and solid waste services has determined that adequate services and infrastructure are available to meet existing and future development at the MRC. Therefore, the Action Alternatives are consistent with this policy.
	Policy 10 – Citizen Engagement in Planning & Development	Public involvement and outreach will be conducted as part of the NEPA process and during implementation of the MRC Master Plan. Therefore, the MRC Master Plan is consistent with this policy.
	Policy 14 – Communities Must Identify Adequate Water Supply, Stormwater & Wastewater Services & Infrastructure to Meet Existing & Future Development	Coordination with local utilities has determined that adequate services and infrastructure are available to meet existing and future development at the MRC. Therefore, the MRC Master Plan is consistent with this policy.

Table 4-8: Consistency with the enforceable policies of the Maryland coastal zone management program

4.3 Public Realm and Viewsheds

The Master Plan will enhance the public realm by:
• strengthening the walkability of the campus to include accessible sidewalks, adequate light, and maintained vegetation along the entry and internal roads,
• promoting wellness by inviting employees to explore the natural landscape and take walks through the forested areas and stream valley at the heart of the campus,
• encouraging cycling to work by improving bike infrastructure for bike commuters,
• supporting the conservation of the natural resources on the campus by a careful configuration of buildings and hardscapes and layout of new features,
• promoting the use of public transportation by increasing ease and convenience through features that will shelter and protect pedestrians from the elements,
• integrating natural stormwater management features like bioswales and ponds into the publicly accessible landscape,
• minimizing energy resources by maintaining and, where possible, increasing the natural landscape and keeping the landscaped, high-maintenance vegetated areas to a minimum.

See also Chapter 3, subchapter 3.8 Streetscape and Landscape for additional information.

4.3.1 Trees

The Master Plan aims to conserve trees as much as possible and leaves most of the forested areas on the MRC untouched. Overall, the removal of trees will be minimized by limiting most of the disturbance to areas that have been previously developed. In areas where trees need to be removed, proper measures will be taken to protect mature vegetation adjacent to new areas of disturbance. Additional trees will be planted along the roads to provide shade and enhance the campus character of the grounds. Where possible the trees lining the internal roads, will be combined with stormwater management features like bioswales. Street trees will also help to protect cyclists from vehicular traffic. Trees used as part of the plant palette will help to connect the interior of the campus to the surrounding forest and tie the grounds back to the ecological context of the region. Species will be carefully selected by evaluating the health of the variety of species that are planted on the grounds today. The ability of trees to survive will also be determined by the soil quality, especially in areas that are on structure. Adequate soil depth and quality will be considered in areas where new trees are proposed.

4.3.2 Viewsheds

The 1981 EIS proposed a landscape buffer to protect views from residential properties along Ellington Drive and from Muirkirk Road as an important campus feature but did not define any historic viewsheds. Generally, the proposed development does not have a significant impact on the viewsheds because the site is very secluded. Where the campus abuts residential properties, the site is significantly buffered from the surrounding neighborhood. The new buildings would only be visible from a few locations. Even in those instances, the forested areas would obscure most of the proposed buildings. Because of the relative location and height of new buildings to the north of MOD 2, the new buildings proposed in Alternatives A and B would be visible from Muirkirk Road. This visibility would be mitigated by the relative distance from the main entrance and the perimeter landscape buffer and forested areas on the campus. In addition to the viewsheds from Muirkirk Road, the new buildings on the BRF site as proposed in Alternatives B and C, may also be visible, depending on seasonal vegetative cover, from the intersection of Muirkirk and Odell Roads looking south from the northeastern edge of the campus. Based on consultation with MHT and other consulting parties, no MOA or PA will be required as there are no historic views.

Figure 4-7: Entrance road looking southeast towards the BRF

Figure 4-8: Entrance from Muirkirk Road

4.4 Proposed Utility Infrastructure

Under all the Action Alternatives, construction of new utility lines both on and off the MRC could result in temporary service disruptions both onsite and at adjacent properties. This impact would be temporary, and relocation of new connections of utility lines would be completed with the least amount of disruption possible to other users. Utility providers would be consulted prior to construction and any proposed relocations of utility lines would be coordinated with utility providers. Therefore, all Action Alternatives would result in short-term, adverse impacts to utility service on and adjacent to the MRC.

4.4.1 Domestic Water

Implementation of the Master Plan would result in increased demand for water service. WSSC conducted a System Planning Forecast (SPF) to review the water and sewer demands for the proposed Master Plan development. The LOF for the SPF, issued on June 28, 2017, concluded that WSSC can provide water service to the expanded site and a new connection could be made to the existing water main at Muirkirk Road without requiring any new public water extension (see Figures 4-9, 4-10 and 4-11). This new connection to the Muirkirk Road water main would provide redundancy to the site for water service. It also concluded that pressure reducing valves would be required for buildings with first floor elevations below 233 feet, and booster pumps would be required for buildings with first floor levels above elevation 265 feet. The LOF further concluded that new connections to the 24-inch line in Odell Road are not recommended and may not be possible due to pipe integrity issues and because this 24-inch line connects the WSSC South Laurel reservoir and pumping station and may be shut down at times for operational purposes. Because the existing water supply would be able to accommodate the increased demand for water service on the MRC, the impact to the regional water supply would be negligible, long term and adverse.

The existing 10-inch water line running along Pasture Road would provide water to some of the new buildings planned near MOD 2. A new 10-inch or 12-inch water service line would connect to the existing 16-inch WSSC water main line at Muirkirk Road just west of the existing main entrance. New onsite water lines would connect to the existing water lines and then run east to provide water service to the buildings planned in the BRF area.

The potable water system materials would be per local WSSC specifications. Distribution piping would be high-pressure Polyvinyl chloride (PVC) or DIP. The new buildings would be fitted with sprinkler systems and fire hydrants would be installed along the site water system to provide adequate fire protection coverage. Adequate emergency access would be provided around the buildings.

4.4.2 Sanitary Sewer

Under all Action Alternatives, the proposed addition of employees and support staff on the MRC will result in an increased demand for sanitary sewer service. Because the existing system can handle the new facilities, a negligible, long-term, adverse impact would occur. In the Letter of Findings for the SPF, WSSC concluded that the required sewer service is available to the expanded site and that an existing 8-inch public sewer line at Lighthouse Drive can provide sewer service to the new development at MRC. However, FDA would need to construct a new offsite public sewer extension along Springfield Road, from Lighthouse Drive to the MRC site boundary, to obtain expanded sewer service to the site.

Under each Alternative, new onsite sewer lines would run from the new buildings, across the site, down to the MRC property boundary near Odell Road, then along the boundary and down to Springfield Road. The new sewer outfall pipe would go offsite (becoming a public line), cross Odell Road, run along Springfield Road, and ultimately connect to a WSSC sewer main at Lighthouse Drive (see Figures 4-12, 4-13 and 4-14).

Under Alternatives A and B, sewer service from MOD 2 and the new buildings planned in that area would be conveyed to the southeast in a new gravity sewer line. This new sewer line would run across the stream valley buffer, and down to the new 8-inch sewer line along Springfield Road (described above). The sewer force main running from the Animal Research Facility could be tied into this new gravity sewer line or into the new gravity sewer line at the BRF area. The sewer force main coming from MOD 1 would be tied into the new gravity sewer line in the BRF area, and the pump station and force main in the BRF area would be removed.

Under Alternative C, a new gravity sewer line could serve the new Maintenance & Storage Building (near MOD 2) while also collecting the sewage from MOD 2 and the force main coming from the Animal Research Facility. The sewer flows would be conveyed down to Springfield Road in the new gravity sewer line (as described in Alternatives A and B above). As an option for Alternative C, sewage from the new Maintenance & Storage Building could go into the existing gravity line running to the Animal Research Facility pump station, and the existing force main from the Animal Research Facility to the BRF would be tied into the new gravity sewer line at the BRF site, which would in turn convey the flow down to Springfield Road. The first option increases construction cost but reduces the load on the pump station at the Animal Research Facility. New sanitary sewer piping would be made of PVC.

4.4.3 Proposed Power

PEPCO would provide the additional power needed for the new development. As design commences, PEPCO would be engaged in the planning. The following energy conservation strategies would be used:

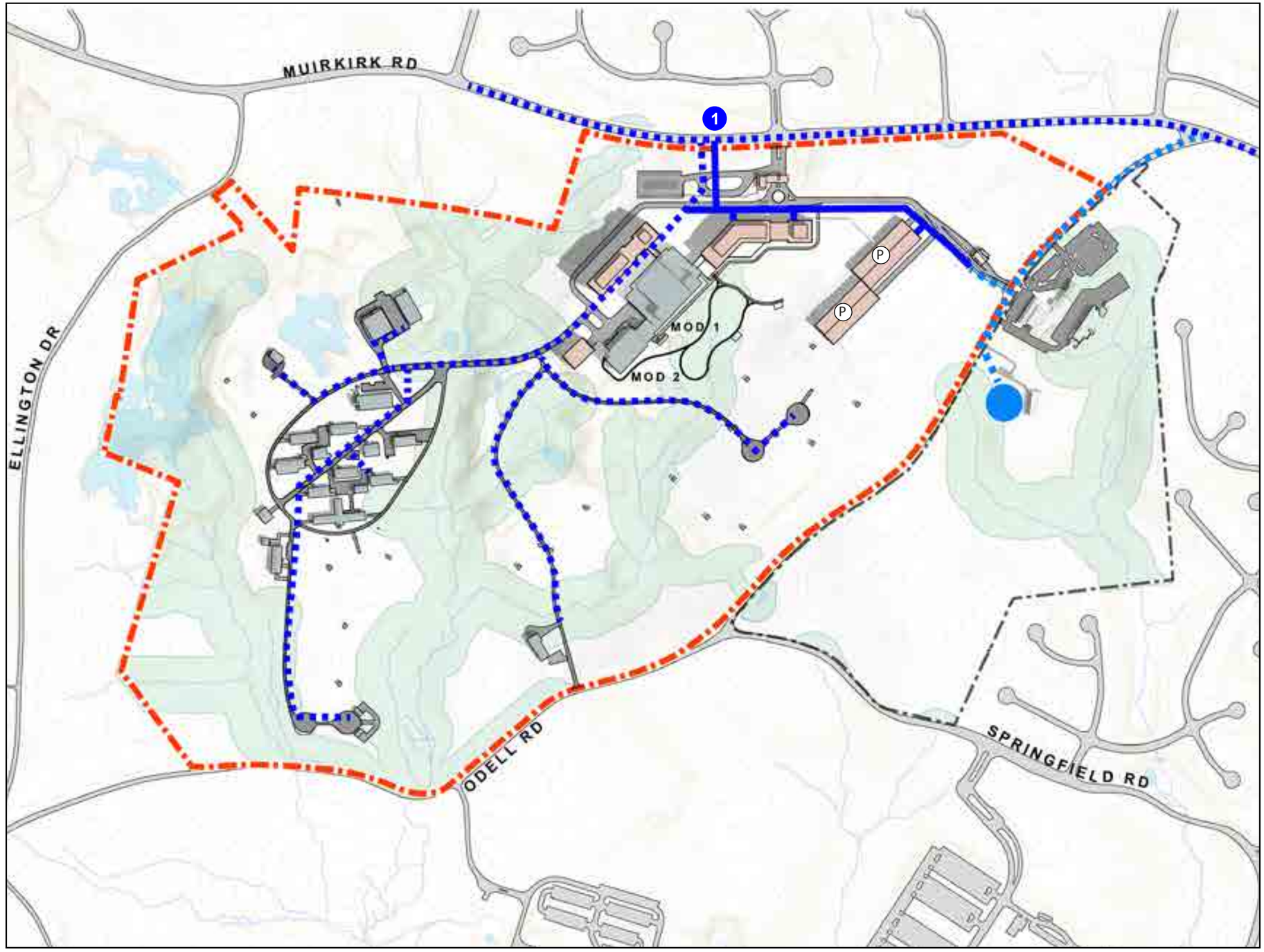
- Rooftop solar panels
- Active and passive solar techniques
- High-efficiency lighting and occupancy sensors
- Modern and efficient heating and cooling equipment
- Natural ventilation systems
- ENERGY STAR® appliances

The MRC would be operated in accordance with EO 13990 and the EISA of 2007, which requires government agencies to:

- reduce energy consumption per square foot by 2.5 percent annually through 2025, relative to 2015 baseline,
- improve and monitor the energy optimization, efficiency, and performance of new and existing data centers,
- ensure that 25 percent of the total amount of building electric and thermal energy should come from clean energy sources by 2025,
- LEED® Gold certification and net zero energy usage would be achieved for all new buildings. Energy conservation measures used to meet LEED® Gold requirements generally align with the requirements of sustainability outlined in EO 13834; therefore, Federal Facilities that are LEED® Gold Certified are in compliance with the EO.

The existing underground electric and telecom duct bank serving the MOD 1 and MOD 2 site will need to be relocated as it falls within the footprints of the proposed buildings for each proposed alternative.

Water Service Plan



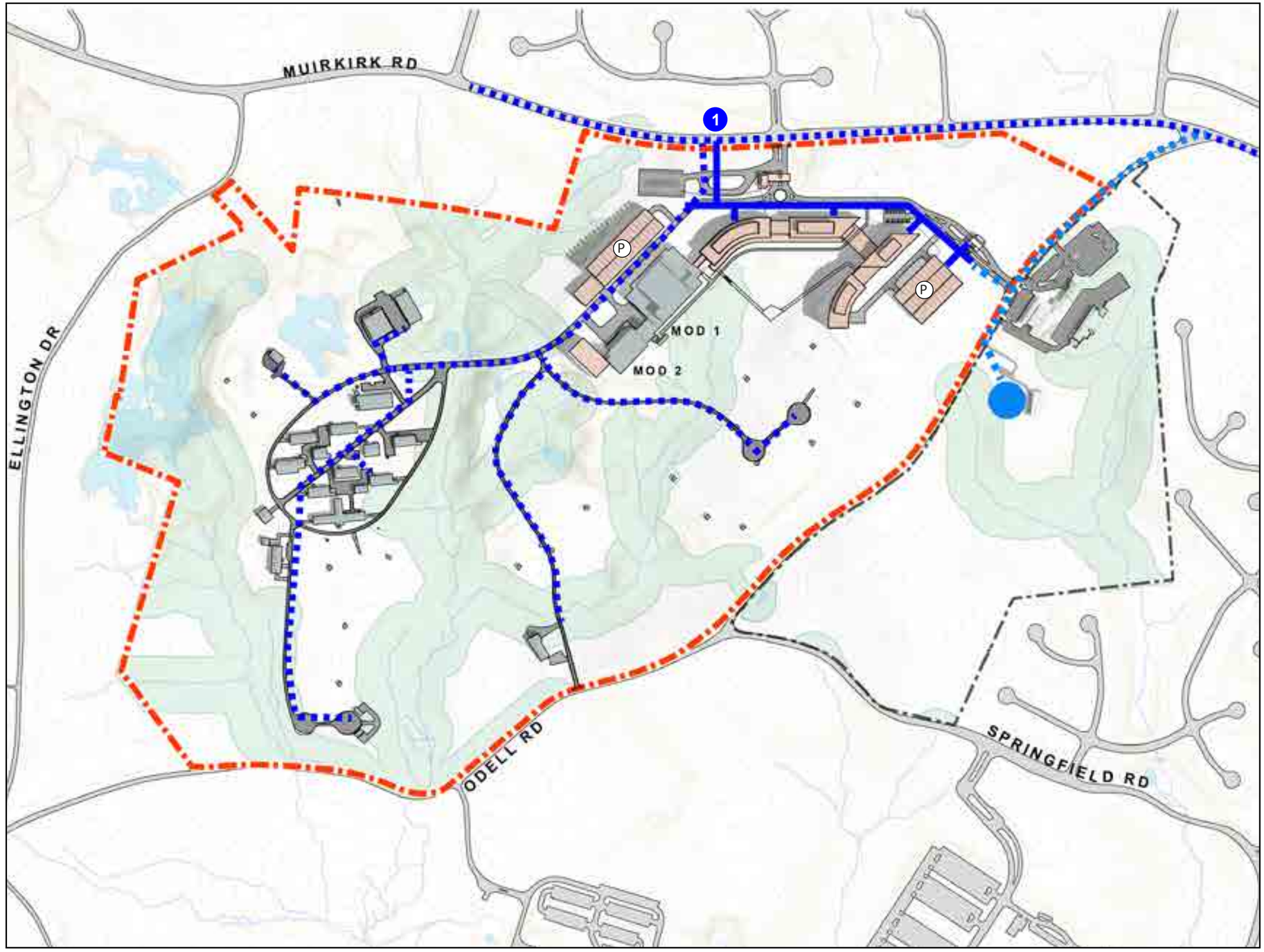
LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- (P) Parking Structure
- Stream Valley Buffer
- New on-site 10” Water Line
- (1) New connection to existing 16” Water Line (Muirkirk Rd)
- Existing on-site Water Lines (TYP)
- Existing 24” Water Line (Odell Rd)
- Existing WSSC Water Tank

0 150 300 600 Feet

Figure 4-9: Alternative A water service plan

Water Service Plan



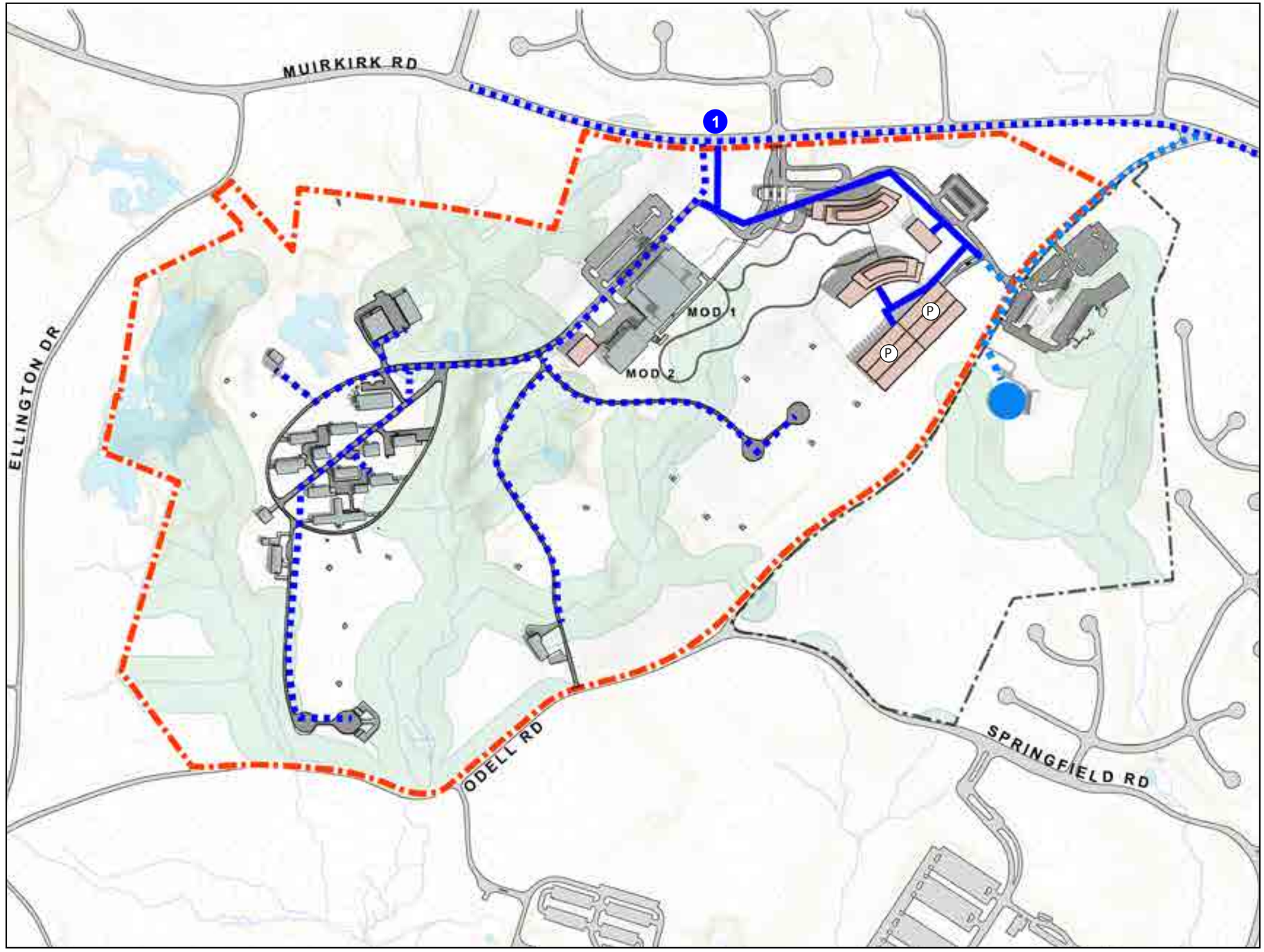
LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- (P) Parking Structure
- Stream Valley Buffer
- New on-site 10” Water Line
- 1 New connection to existing 16” Water Line (Muirkirk Rd)
- Existing on-site Water Lines (TYP)
- Existing 24” Water Line (Odell Rd)
- Existing WSSC Water Tank

0 150 300 600 Feet

Figure 4-10: Alternative B water service plan

Water Service Plan



LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- (P) Parking Structure
- Stream Valley Buffer
- New on-site 10” Water Line
- 1 New connection to existing 16” Water Line (Muirkirk Rd)
- Existing on-site Water Lines (TYP)
- Existing 24” Water Line (Odell Rd)
- Existing WSSC Water Tank

0 150 300 600 Feet

Figure 4-11: Alternative C water service plan

Sewer Service Plan

LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- (P) Parking Structure
- Stream Valley Buffer
- New 8” on-site Sewer Lines (TYP)
- Existing Sewer Force Main (TYP)
- Existing Gravity Main
- New off-site 8” Public Sewer Extension along Springfield Rd (potentially deep sewer in spots)
- Connection to existing 8” Public Sewer at Lighthouse Dr
- Existing Manhole
- Existing Sewer Pump Station
- 1 Force Mains are tied into new Sewer Lines and Gravity Sewer is removed/ abandoned

0 150 300 600 Feet

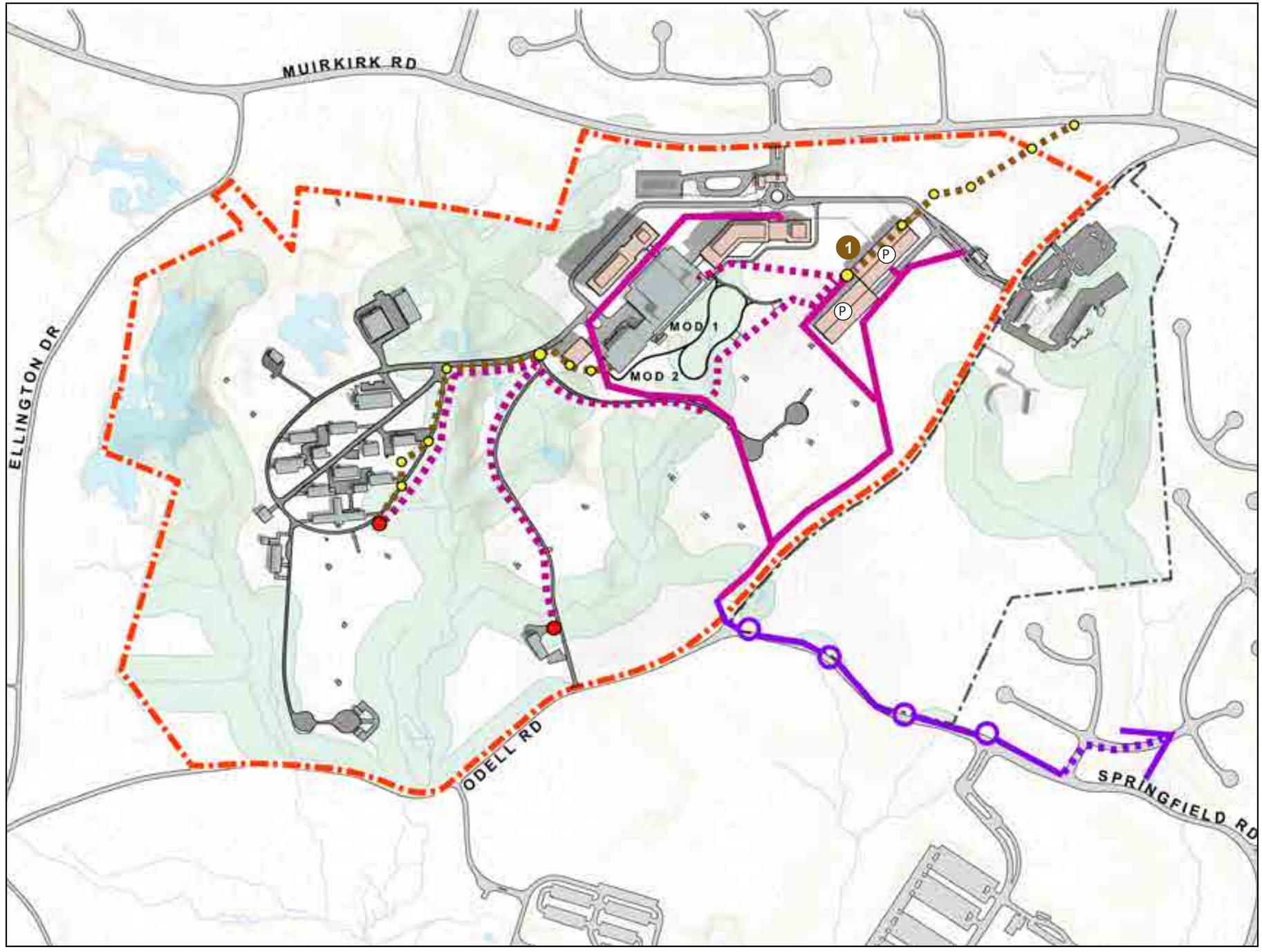


Figure 4-12: Alternative A sewer service plan

Sewer Service Plan

LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- (P) Parking Structure
- Stream Valley Buffer
- New 8” on-site Sewer Lines (TYP)
- Existing Sewer Force Main (TYP)
- Existing Gravity Main
- New off-site 8” Public Sewer Extension along Springfield Rd (potentially deep sewer in spots)
- Connection to existing 8” Public Sewer at Lighthouse Dr
- Existing Manhole
- Existing Sewer Pump Station
- 1 Force Mains are tied into new Sewer Lines and Gravity Sewer is removed/ abandoned

0 150 300 600 Feet

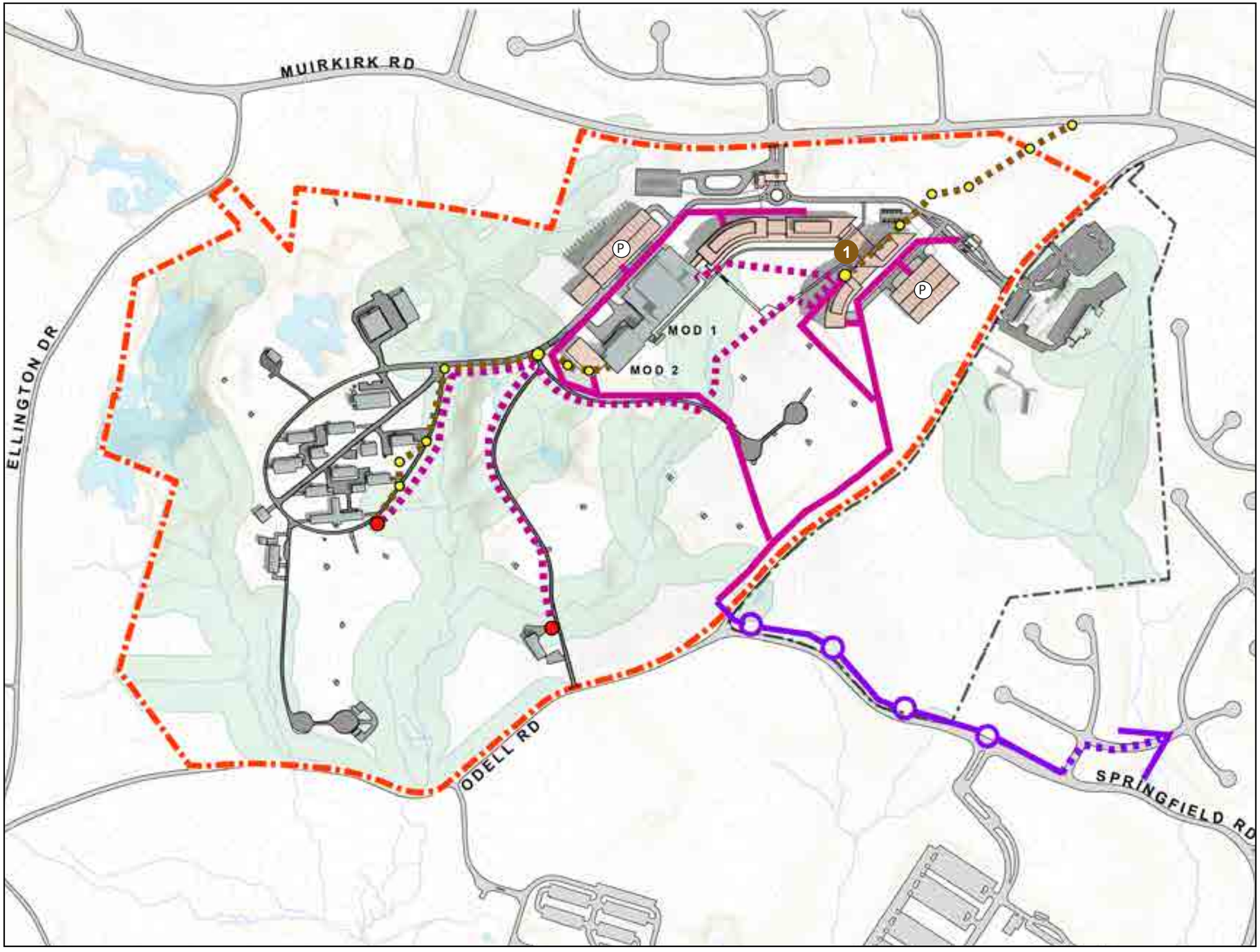


Figure 4-13: Alternative B sewer service plan

Sewer Service Plan

LEGEND

- MRC
- East Parcel
- Existing Buildings
- New Buildings
- (P) Parking Structure
- Stream Valley Buffer
- New 8” on-site Sewer Lines (TYP)
- Existing Sewer Force Main (TYP)
- Existing Gravity Main
- New off-site 8” Public Sewer Extension along Springfield Rd (potentially deep sewer in spots)
- Connection to existing 8” Public Sewer at Lighthouse Dr
- Existing Manhole
- Existing Sewer Pump Station
- Optional Gravity Sewer Lines (see 1 below)
- 1 New 8” Gravity Sewer serves MOD 2 area and force main from ARL area is tied in; or new building ties into the Gravity Sewer to ARL and force main from ARL is tied into new Gravity Sewer at the BRF area.

0 150 300 600 Feet

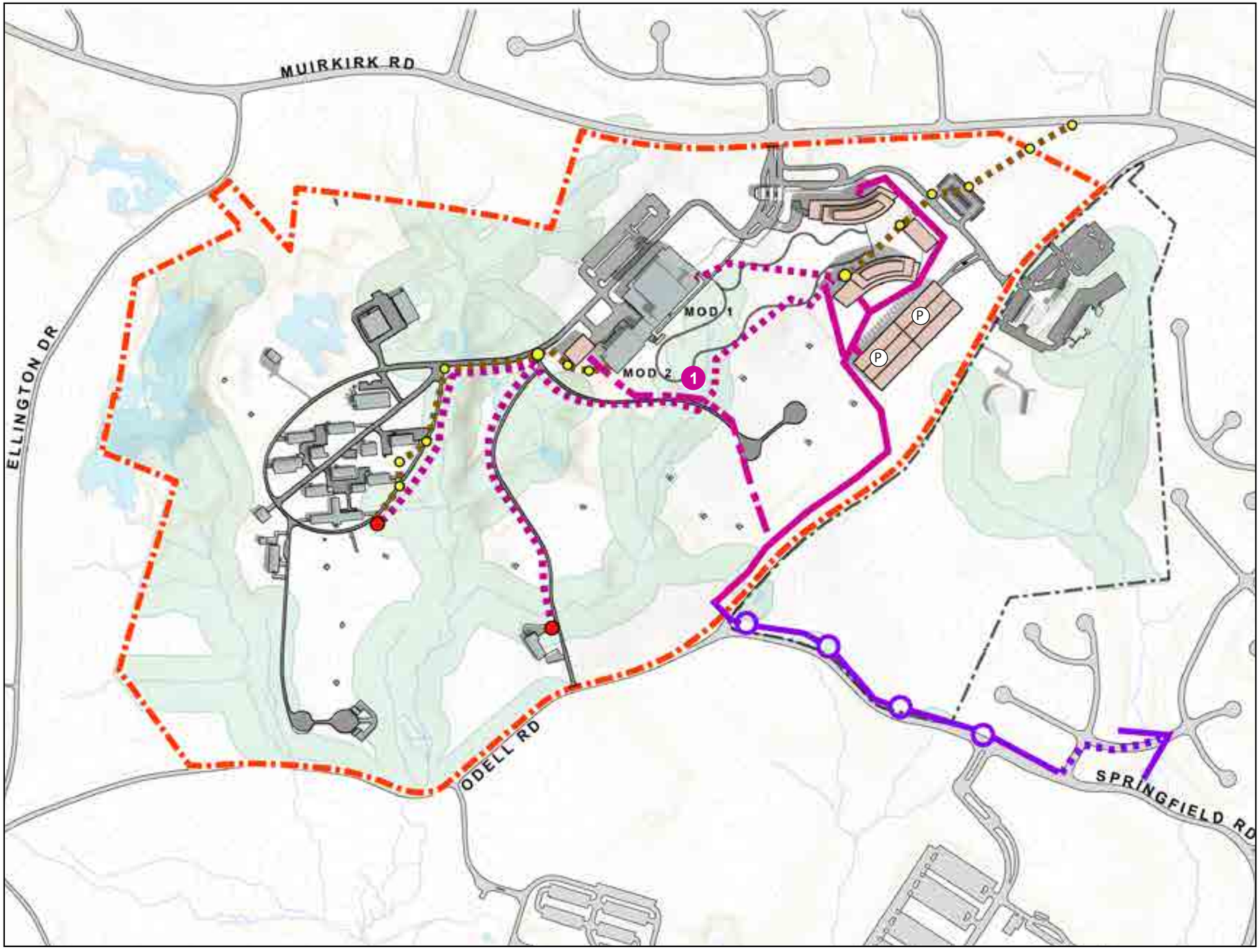


Figure 4-14: Alternative C sewer service plan

Entrance road looking northwest towards MOD 1 parking lot